FOREST STEWARDSHIP PLAN FOR SOAP CREEK WILDLIFE MANAGEMENT AREA -APPANOOSE COUNTY-

Barnes Tract And Tubaugh WMA

Prepared June 27, 2011 by

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INTRODUCTION

A responsibility of the Iowa Department of Natural Resources (IDNR) is to assist Iowans in the guidance of habitat management for game and non-game species of animals which live within or migrate into this beautiful land we call Iowa. State-owned lands which are administered by the Iowa D.N.R. receive direct management efforts for wildlife, wood production, recreation, soil conservation, and plant and animal species of special concern.

The land management section of the D.N.R. Wildlife Bureau is divided into 16 geographic units. Within a unit, a wildlife management biologist and his staff are responsible for the maintenance and operation of the Wildlife Management Areas (WMA). The vegetative composition and geography of a WMA can vary greatly. Most contain some row crop, some forestland and some areas of non-native grasses and forbs. Many also have creeks or rivers, natural or artificial wetlands, or native prairie grasses and forbs.

In recent years, the wildlife bureau has recognized and acted on the need for forest wildlife stewardship plans (FWSP"s) to properly manage their forest resources. Forests are not static systems, even though changes occur over a long period of time. A hands-off or "preservation" philosophy will insure that the forest of 100 years from now will be much different than the forest of today. Some forest stands may take more than 120 years to mature, a time span that may extend through the careers of several managers. This slow but relentless change requires us as managers to plan over the long-term and leave a written record of these plans in the form of FWSP"s.

OBJECTIVES

Because the Soap Creek WMA (Barnes tract and Tubaugh WMA) are **wildlife** management areas, the primary focus of the FWSP will be to provide habitat for a wide variety of forest wildlife species. Unfortunately there is no one type of forest that can provide all of the requirements for all forest wildlife species. Different species require different (and sometimes quite specific) types of forest species and ages classes. Likewise, some wildlife species require an abundance of forest edge while others need relatively large blocks of un-fragmented forest.

Funding for the acquisition and management of the Soap Creek WMA has been almost exclusively hunter generated monies, i.e. license fees and excise taxes on sporting equipment. Consequently, a primary objective for management of the area is to improve habitat for hunted species such as deer, turkey, squirrels, and bobwhite quail. On the other hand, the IDNR should be obligated to consider the effects of its management actions on non-hunted species as well, particularly those that are threatened, endangered, or species of special concern. The wildlife bureau's "State Comprehensive Wildlife Conservation Plan" identifies those species it considers in "greatest conservation need" (refer to page 29). Recognizing that it is difficult if not impossible to manage for all of these species at the same time and on one tract, this list will, however, provide an important guideline by which management strategies and decisions will be made.

MANAGEMENT CONSIDERATIONS

There are several considerations that have entered into the formulation of this FWSP for the Soap Creek WMA Barnes and Tubaugh Areas:

1. There has been a steady decline and projected future decline in oak forest throughout Iowa caused by continuous succession of forest stands to the more shade tolerant species such as elm, ash, hackberry, basswood, ironwood, and bitternut hickory. Oak-hickory forests are extremely important for a wide variety of wildlife species in Iowa. Mast from these species provides an important food resource for many mammal and bird species. The eventual replacement of oak forest with shade tolerant species would undoubtedly have a severe negative effect on a huge variety of game and non-game species.

2. The decline of many forest interior bird species such as Acadian flycatchers, veerys, wood thrushes, cerulean and Kentucky warblers and other neotropical migrants. Forest fragmentation and associated cowbird parasitism are considered among the factors causing declines in some of these species. Iowa is a state with exceptionally fragmented forests where addressing the needs of some of these large-block, interior nesting species is particularly difficult, if not impossible. The Soap Creek WMA, however, is part of a relatively large block (by Iowa standards) of public and private timber. It is important to consider the habitat components of this larger landscape when making land management decisions and every attempt should be made to minimize fragmentation of this forest when designing and implementing silviculture practices.

3. There has been a loss of early succession forest stands and associated wildlife species throughout much of southern Iowa. Many of the disturbance factors such as fire, grazing, and cutting have dramatically decreased over the past 40 years. As a result, much of the upland forest in this vicinity has progressed beyond the early succession stage. While this may have been beneficial to those wildlife species requiring more mature forests, it has probably been a negative for species such as bobwhite quail, woodcock, black-billed and yellow-billed cuckoos, and blue-winged warblers.

This FWSP starts with the assumption that it is very important to maintain an oak-hickory forest to the extent possible. The improvement of oak-hickory forest on public land becomes even more important in light of likely future trends on privately held forest. Much of this private forest has been subdivided and sold to sportsmen and small acreage holders, many of whom will probably be resistant to implementing the forestry practices necessary to regenerate oak. If this occurs, much of the forest landscape in Iowa will eventually convert to shade tolerant species at the expense of oak.

MANAGEMENT STRATEGIES

Several management strategies will need to be used to implement the objectives of the plan within the management considerations mentioned above:

1. Early succession stages and mature stages of forest both tend to be more productive for a variety of wildlife than the intermediate crowded pole-size stage. Timber stand improvement practices such as basal area thinning and crop tree release should be used to minimize the time a stand must spend in this intermediate stage.

2. While there is no feasible way of extending the early succession stage of a forest stand, the mature stage of succession may be able to be extended significantly beyond the typical 100 or 120 year rotation age. While this may result in some decline in timber quality and economic return, the trade-off value for certain wildlife species may make it worth it. The longer rotation should tend to reduce the amount of fragmentation needed to regenerate the stand. The limiting factor may be how long the rotation can be extended without jeopardizing natural oak regeneration. Natural regeneration is preferred and planting should be avoided if at all possible.

3. Natural oak regeneration requires sunlight to give the oak seedlings a competitive edge over shade tolerant species. Future clearcuts and shelterwood cuts (described under Proposed Management Systems) will be the typical systems used for regenerating oak. To prevent any potential negative effects on interior nesting species, clearcuts should be kept as small as possible (3-10 acres) while still large enough to achieve oak regeneration and be economically feasible. Subdividing larger stands will be necessary to keep clearcuts as small as possible. It should be emphasized that income generation is not the goal behind FWSP's.

4. Some interior nesting bird species seem to select for large spreading “wolf trees” within a given stand. When timber stand improvement, clearcuts and shelterwood cuts are marked, these trees should be left standing, especially since they typically have little economic value.

5. Many wildlife species require dead or dying trees to provide insects for food and cavities for nesting. When timber stand improvement, clearcuts and shelterwood cuts are marked for harvest, provisions should be made to leave a number of cull trees, snags, and cavity trees to provide this component for the future stand.

6. It is probable that Indiana bats use this area during the summer, in particular the riparian forest adjacent to Soap Creek and its tributary creeks. Cutting on any stands described in this FWSP must be done in a manner that does not disturb potential bat maternity trees during the breeding season.

7. This FWSP should be updated regularly as more information becomes available on wildlife use and on the efficacy of various silvicultural/management procedures. If funding is available, wildlife surveys should be done to determine species use to help evaluate success of management decisions.

MANAGEMENT SYSTEMS

Proposed management recommendations for each stand are based on whether the area will be managed to create an even age system or early successional habitat. The decision on what system would be used was based on the objectives for the area to maintain an oak component where feasible, develop a diverse woodland landscape, protect fragile sites, and improve water quality.

Early Succession Management – Many bird species such as bobwhite quail, American woodcock, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo, and eastern towhee are dependent on the early successional stages of woody growth. The high stem density of both trees and shrubs provides suitable nesting habitat and protection from predators. The majority of early succession management prescribed in this plan is on the woodland edges. This work will “feather” the edges and make a gradual transition from the field edges to the larger trees. Feathering and softening the edges may lessen nest parasitism of interior forest bird species by brown-headed cowbirds. The early succession management areas will be managed on a 15-20 year rotation. In other words, every 15-20 years the stands will be cut to create areas with high stem density.

Even Age Management – Even age management involves growing a stand of trees which are close to the same age. At some point in a stand‟s life, the area is clear cut which results in the even age structure. This type of management creates excellent habitat for deer, turkey, squirrels and other hunted and non-hunted wildlife species. It is essential for regeneration of oak, which requires full sunlight. The only way that oak can be maintained as a component of the forest over the long run is by practicing some form of even age management.

Each stage or age class of an even age stand provides habitat for a suite of wildlife species. For example, regenerating stands (1-10 years old) benefit the same species as do early succession stands, i.e. blue-winged warblers, black-billed cuckoo, yellow-billed cuckoo, eastern towhee, as well as bobwhite quail and American woodcock.

Sapling to small pole size stands between 10-20 years old may be used by black and white, Kentucky, and worm-eating warblers. Pole size to medium size trees (20-60 years) tend to be used by canopy nesters such as scarlet tanagers, wood thrushes, and ground nesters such as ovenbirds and black and white warblers.

Mature stands of 60-125+ years of age are used by birds such as the wood thrush, Acadian flycatcher, ovenbird, worm eating warbler, and scarlet tanager.

As woodland stands age, they constantly lose trees to shading, insects, disease, etc. The dead and dying trees provide habitat for cavity nesters such as woodpeckers, nuthatches, titmice, and creepers. The federally endangered Indiana bat uses loose barked live trees such as hickory as well as the sloughing bark from dying trees for their maternity colonies.

Thus, even age management has the potential to provide a large variety of age classes that can meet the needs of a variety of wildlife species.

While there are many methods to open a stand to sunlight, clear cutting and shelter wood harvesting are the most common. Clear cutting is a practice that opens the stand all at once. Regeneration via clear cutting requires there be sufficient oak seedlings or advanced regeneration present. Minus these seedlings, planting may be necessary following clear cutting.

Shelter wood harvests are one way of encouraging seedling production prior to a clear cut. Shelter wood harvests include several thinnings done prior to the final clearcut. If the shelter wood is done correctly, the trees left after the thinnings will provide seed and the forest will be open enough to allow sunlight to reach the forest floor. The trees left will also help provide shade that limits the growth of undesirable or invasive plant species. This method can take many years to create the next oak stand and may need mechanical or fire disturbance to keep out undesirable species. After sufficient seedling or advanced regeneration is present, the stand needs to be clear cut to successfully regenerate the oak stand.

Crop tree release is discussed in this plan. This practice is done most frequently when the trees are pole sized. The goal of the practice is to choose no more than 50 trees per acre that are considered to have the best genetics. These trees are typically tallied and marked with paint, and then the trees that touch the canopy of the crop tree are killed to allow the tree to reach maximum growth potential.

Thinning the understory is a practice also used in even age management. This practice involves removing trees that are below the main canopy to allow more sun light to get to the forest floor. Ironwood, sugar maple, and other shade tolerant species warrant this practice if species like oak are wanted in the future.

Fire is an effective and inexpensive tool that has a long history of use and continues to be studied in managing oak stands. Occasional burning of the leaf layer in the woods will kill thin barked species such as hard maple, cherry, elm, bitternut hickory and iron wood. Fire will expose mineral soil and open up the ground to sunlight. These conditions favor the natural regeneration of oak. Depending on the extent of root system

development, some oak seedlings will tolerate fire better than others, but as a whole, oaks tolerate fire better than other tree species. The top of an oak seedling often will die back following fire, but the roots will send up new growth soon thereafter.

Income from timber harvest: Any income generated from timber harvesting operations at the should be reinvested into the area to thin young stands, convert areas to more desirable species and otherwise manage the forest for wildlife, and invest in surveys and/or research to evaluate success of management decisions and help direct future management. Without this reinvestment, there is little chance that the WMA annual budget will allow the recommendations in this plan to be implemented. Harvesting is a very minimal portion of this plan. The majority of work recommended is directed at thinning young stands so the oak is not shaded by other trees and at removing undesirable species to encourage regeneration of desirable trees. Tubaugh WMA is an exception due to federal monies used to acquire the property. This requires any income to be credited back to the US Fish and Wildlife Service.

DESCRIPTION OF THE BARNES TRACT

The Barnes tract is located 3 miles northeast of Unionville on Highway T61 in Union township section 13, T70N R16W, Appanoose County, Iowa.

250 total acres

230.8 acres upland timber

13.2 acres watershed structure

6.2 acres right-of-way

The Barnes Tract was purchased from Nita Barnes in 1986 with state wildlife habitat stamp funding. It is also adjacent to Compartments 6 and 7 of Unionville Unit, Stephens State Forest.

For purposes of this FWSP, the Barnes tract forestland was divided into 30 stands shown in the stand map on the next page. Each stand is described in this plan and recommendations are outlined for woodland management by stand. A priority level has been established for each stand recommendation to assist in management decisions.

BARNES TRACT STAND MAP

Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 2009 **Map prepared: 5/19/2011 by Jeremy Cochran**

Legend
section lines
forest stands

N

1 inch = 660 feet

Current distribution of tree size classes at Barnes Tract

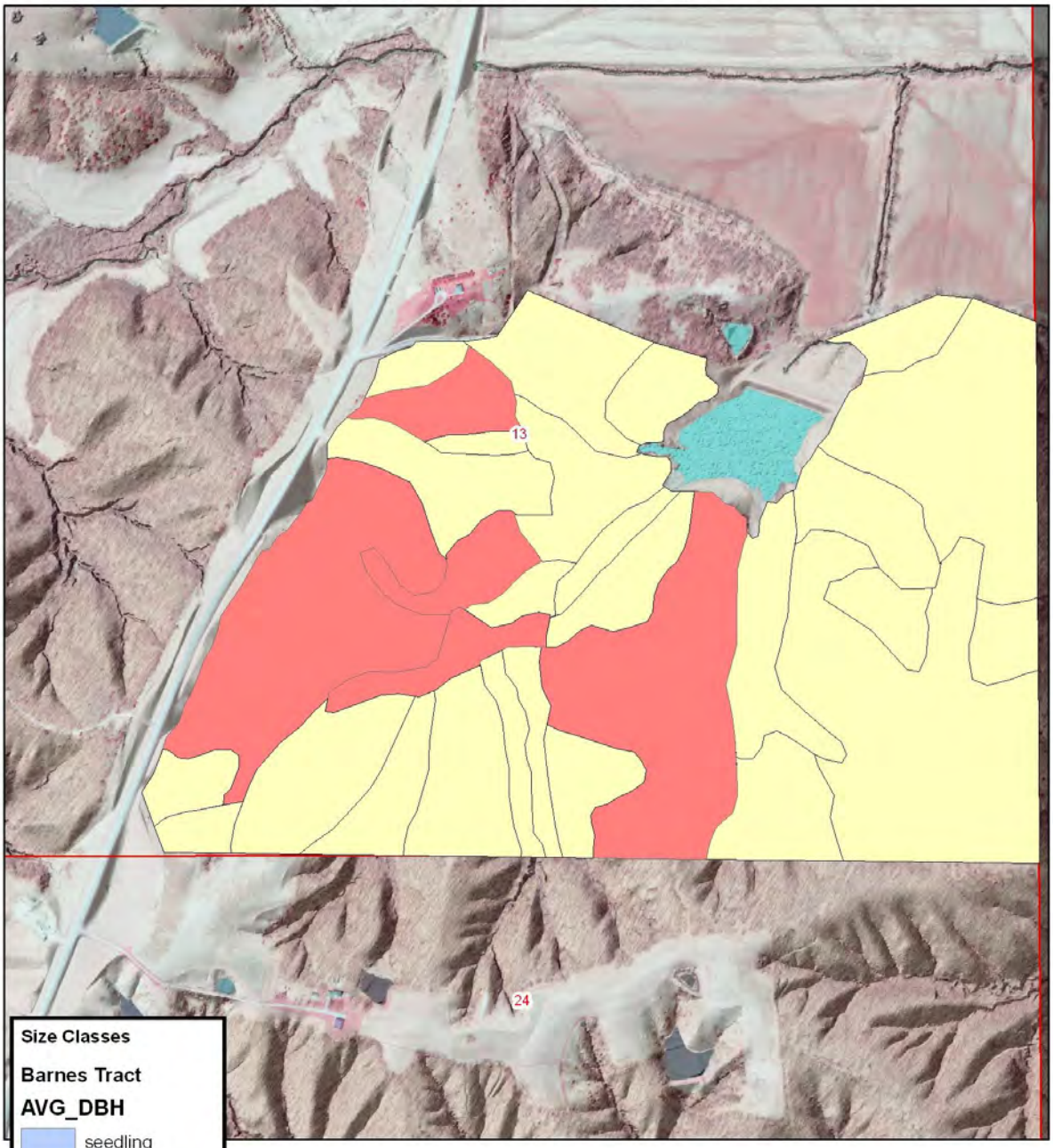
Size Class	Acres	Percent of total forest
Seedling (0-1” dbh)	0	0
Sapling (1-4” dbh)	0	0
Pole (4-12” dbh)	165	71%
Small sawtimber (12-18” dbh)	66	28%
Sawtimber (18” and larger)	0	0

Proposed management systems at Barnes Tract

Management System	Acres	Percent of total forest
Even-aged	216	94%
Early-successional	15	5%

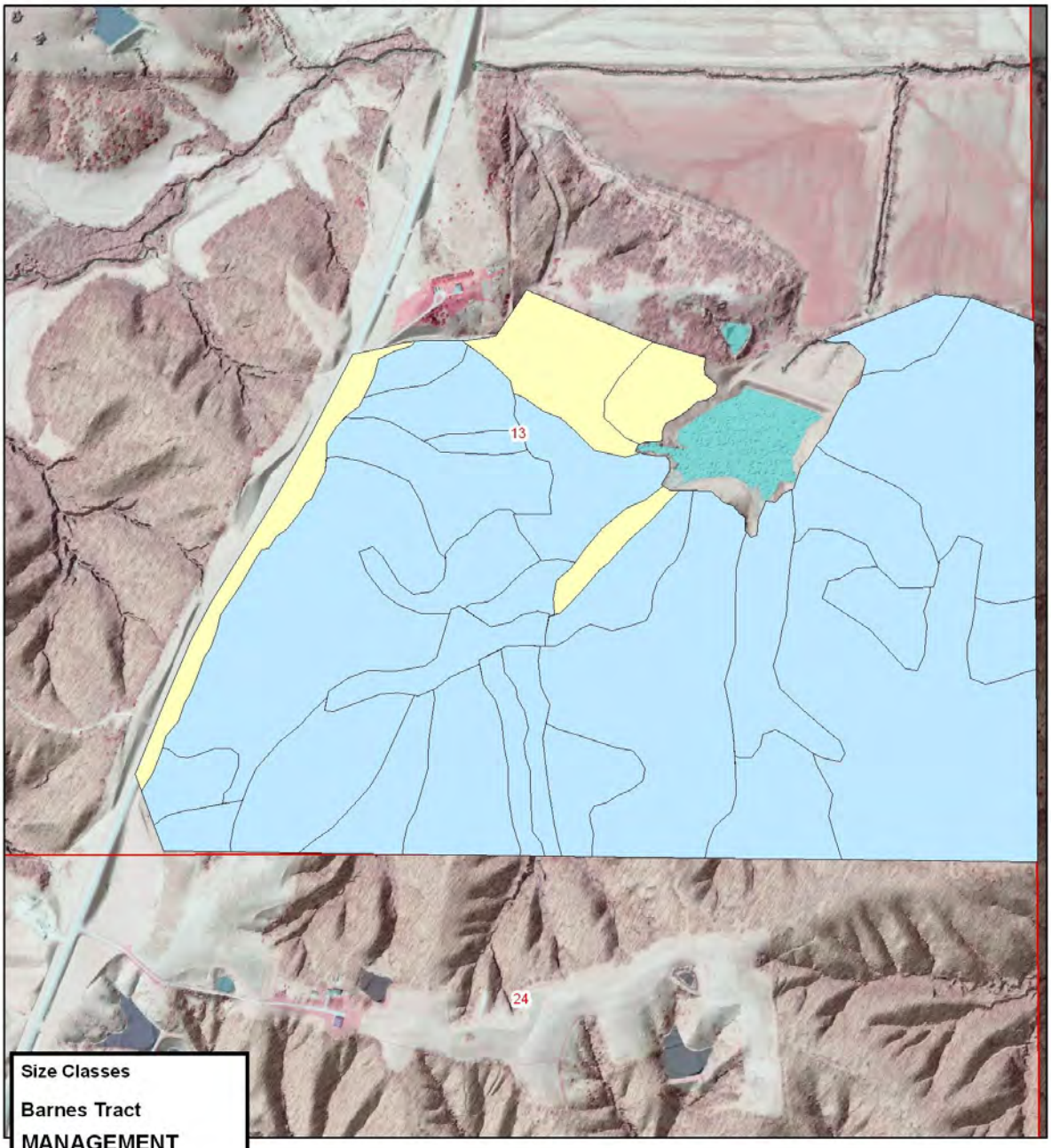
BARNES TRACT SIZE CLASS MAP

Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 2009 Map prepared: 5/19/2011 by Jeremy Cochran



BARNES TRACT MANAGEMENT SYSTEM MAP

Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 2009 **Map prepared: 5/19/2011 by Jeremy Cochran**



BARNES TRACT WORK PLAN

STAND 1 – 8.5 ACRES

Stand 1 lies on south, east and north-facing slopes above a drainage that runs southeast into the watershed structure. Most of the site is on Lindley loam soil, 14 to 24% slope with Keswick loam, 9 to 14% upslope on the north-slope. The stand is mostly seedling to small pole-size stems and scattered oak, honey locust and hickory with 10 to 17-inch diameter stems. Shingle oak comprises more than 25% of the stem count with bur oak and black oak each comprising 10 to 25%. White oak, shagbark hickory, hackberry, white elm, red elm, black cherry, honey locust and redcedar each comprise less than 10% of the stem count. There are also a few hawthorns. The understory through most of the stand is thick and 4 to 7 feet tall. It contains coralberry, gooseberry, black raspberry and blackberry. The regeneration is white elm, hackberry, black oak, shagbark hickory and shingle oak.

PRESCRIPTION – The priority for management for wildlife is 4and for commercial production is 1. Release redcedar which have full crowns from competing crowns; don't cut any competing white or bur oak in the process. The early succession stage existing in much of the stand can be perpetuated by:

- cutting the honey locust and white elm which are at least 5 inches d.b.h.
- releasing all of the white oak and bur oak and relatively straight cherry from shingle oak, hickory and hackberry; this release will also increase the seed production of these species for mast and for regeneration
- releasing full-crowned black oak from shingle oak, hickory and hackberry; the total number of trees released per acre should be approximately 35 per acre; this is an <u>average</u> spacing between released trees of about 35 feet; some portions of the stand do not have enough desirable stems to average 35 released trees per acre;

STAND 2 – 22.3 ACRES

The stand is on Keswick loam on a split ridge and on Lindley loam on the adjoining west, north and east-facing 14 to 24% slopes. The basal area ranges from 60 to 120 square feet with an average of 80 sq. ft.. Stem diameters range from 3 to 26 inches. The majority of the stems are pole-size with an average of 8 inches with a low basal area of sawtimber. In the southeast part, the stem size averages smaller than 8 inches. More than 25% of the stem count is black oak with bur oak shagbark hickory and white elm each comprising 10 to 25% of the stem count. White oak, red oak, shingle oak, bitternut hickory red elm, white ash, ironwood and honey locust each comprise less than 10%. There are also a few black cherries and walnut, a few Ohio buckeye saplings in the northeast part and a few serviceberries. The understory ranges from sparse to thick but is mostly sparse and 2 to 3 feet tall. The shrubs are mostly coralberry, prickly-ash and gooseberry with some multiflora rose and the bramble, black raspberry. The regeneration is white elm, white ash and black oak with the ash being the most

common. There are also some bitternut hickory and white oak seedlings. There are abundant white and red elm saplings in several areas and ironwood seedlings in a few spots.

PRESCRIPTION – The priority for management for wildlife is 3 and for commercial production. Deaden all ash and white elm which are at least 5 inches d.b.h. excepting those stems with existing or potential cavities. Kill all ironwood 2 inches d.b.h. and larger. Also, kill poor-quality bitternut hickory. In order of priority: 1. release the few walnut 2. release large, old white oak and black oak plus any red oak and cherry 3. release other white oak and the bur oak

In the northeast ¼ of the stand, ironwood is common. In the southwest portion of the stand, the percentage of white oak is higher than in the rest of the stand and crown release will likely result in a greater increase in white oak regeneration. One or two years after the work is completed in these two locations, complete a late spring burn through the sites to favor oak regeneration.

Fell and buck an average of 2 of the largest white elm or white ash per acre for coarse woody debris.

STAND 3 – 33.5 ACRES

Stand 3 lies on a long southwest to northeast ridge with small branch ridges as well as side slope of a variety of aspects. The soil type on the ridge is Weller silt loam, 5 to 9% slope with Keswick loam, 5 to 9% slope off the ridge and Lindley loam, 14 to 24% down slope. White oak comprises more than 25% of the stem count with black oak, shagbark hickory and white elm each comprising 10 to 25% of the stem count. Less than 10% of the stems are white ash. There are low numbers of bur and red oak present and also a few red elm, bitternut hickory, black cherry, redcedar and pole-size honey locust. The stem sizes range from 3 to 20 inches d.b.h. with most of the stems between 8 and 15 inches d.b.h.. The basal area ranges from 50 to 120 with an average of 80 square feet. The understory ranges from sparse to moderately thick and is 2 to 3 feet tall. It contains coralberry, gooseberry, blackberry, some fragrant sumac and some black raspberry and a low number of multiflora rose. The regeneration is white ash, black oak, shagbark hickory, white oak, and a few hackberries. Ash regeneration is the most common by far. The saplings and small poles which are present are mostly white elm and shagbark hickory. In some spots, there is already an adequate number of oak seedlings for succession to oak. Ironwood seedlings are common in some areas; ironwood saplings are less common.

PRESCRIPTION – The priority for management for wildlife ranges from 2 to 3 depending upon the area within the stand.

Throughout the stand, release all of the red oak, black cherry and bur oak and kill all ash and ironwood which are 2 inches d.b.h. and larger.

Kill all white elm which are 5 inches d.b.h. and larger.

Fell and buck an average of 2 of the largest white elm or white ash per acre for coarse woody debris.

In portions of the stand where white oak comprises more than 50% of the stem count, release 2 or 3 each of the black oak and shagbark hickory to favor species/mast diversity. Do not kill any white oak with good surface quality in the process.

Where white oak comprises less than 50% of the stem count, release the large white oak. Also, release about 10 good-quality white oak and black oak poles per acre. Do not kill any shagbark hickory larger than 12 inches d.b.h. in the process.

STAND 4 – 3.0 ACRES

The stand is on north and south-facing 14 to 24% slopes on either side of a small drainage. It contains mostly white ash, ironwood and hickory 3 to 9 inches d.b.h. with a low percentage of ash and hickory 10 to 16 inches d.b.h., a low number of white oak, black oak and red oak sawtimber trees per acre and some poles of the same species. The basal area averages 60 square feet per acre.

The understory is short and sparse with coralberry, gooseberry, blackberry and a few multiflora rose with white elm, ironwood, bitternut hickory, black oak and white oak regeneration.

PRESCRIPTION - Kill all ironwood, ash, bitternut hickory and elm 2 inches d.b.h. and larger leaving standing just the oak, shagbark hickory and redcedar.

Fell and buck 10 of the largest ash for coarse woody debris.

STAND 5 – 3.5 ACRES

Stand 5 lies on a small finger ridge off the northeast side of a main ridge on Keswick loam soils with a 5 to 9% slope. White oak, black oak, shagbark hickory and white elm each comprise 10 to 25% of the stem count, white ash and bitternut hickory each comprise less than 10%, and there are a few bur oak, black cherry and honey locust. The stems vary from 3 to 17 inches d.b.h. with most being 7 to 10 inches. The basal area averages 70 square feet. The understory is sparse and thin and contains coralberry, gooseberry, prickly-ash, black raspberry, blackberry and some fragrant sumac. The regeneration is mostly white elm, bitternut hickory, black oak and white oak.

PRESCRIPTION – This is a good ridge to thicken up for bedding and nesting cover; the priority for management for wildlife is 4. The basal area is already relatively low. Reducing it down to 30 or 40 square feet will thicken it up quite well and favor oak regeneration. Kill all of the ash, elm and locust 2 inches d.b.h. and larger. Leave alive and standing all of the white oak and cherry, approximately ½ of the largest black oak

and about 20 of the largest shagbark hickory. Kill the rest of the hickory and black oak unless they have cavities.

STAND 6 – 3.4 ACRES

The stand lies at the toe of a northwest-facing 14 to 18% slope adjacent to a bottomland field on private property. The soil type is Lindley loam. Shingle oak comprises more than 25% of the stem count with black oak and white elm each 10 to 25%, black cherry less than 10% and with several swamp white oak saplings and poles and a few white oak, bur oak, bitternut hickory and redcedar. Most of the stems are between 3 and 8 inches d.b.h. with some larger oak and honey locust. There are also a couple big old cottonwoods. The average basal area is 70 square feet. The understory is fairly thick and tall with coralberry, gooseberry, black raspberry and some hazelnut and multiflora rose. The regeneration is mainly white ash.

PRESCRIPTION – The stand has been used by deer for bedding. The priority for management for wildlife is 4. The proposed work will balance species diversity and increase the density of the understory. Kill the honey locust, white elm and ash which are 5 inches d.b.h. and larger. In order of priority: 1. release the swamp white oak and the one small walnut pole; give the swamp white oak at least 10 to 20 feet of space 2. release the few bur oak and white oak 3. release approximately 35 of the black oak favoring those which have good surface quality.

STAND 7 – 6.5 ACRES

Stand 7 is on southwest and northeast-facing slopes on either side of a drainage running northwest into the watershed structure. The slopes are 14 to 24% on Lindley loam soils. Most of the stems are shagbark hickory, bitternut hickory and white ash with white oak, red oak, white elm and basswood each comprising less than 10% of the stem count. There are also a few black cherry. At the west end of the drainage are some small shingle oak poles. The stem sizes range from 5 to 16 inches with a few old saw including a large old red oak sawtimber trees. Most of the stems are between 6 and 11 inches d.b.h.. The average basal area is 80 square feet. The understory is sparse and short with coralberry and gooseberry. The regeneration is hackberry and bitternut hickory with a low number of white elm.

PRESCRIPTION – The priority for management for wildlife is 2. Kill the elm 5 inches d.b.h. and larger. In order of priority: 1. release white oak, red oak and good cherry poles 2. release bur oak 3. release basswood – leave alive any hackberry sawtimber.

STAND 8 – 8.1 ACRES

The stand lies along both sides of the major north-south drainage which drains into the watershed structure. The soil type is mainly Olmitz-Vesser-Colo complex, 2 to 5% slope with a small percentage of steeper slopes up a southeast branch of the drainage. Bitternut hickory comprises more than 25% of the stem count, shingle oak comprises 10 to 25%, and swamp white oak, bur oak, black oak, shagbark hickory, hackberry, white elm, red elm and honey locust each comprise less than 10%. There are also a few hawthorn and cottonwood and at least 3 black cherry. Most stems are between 5 and 9 inches d.b.h.. Most of the bur oak are larger stems. The understory varies from sparse to dense with coralberry, gooseberry, prickly-ash, black raspberry, blackberry and bristly green brier plus multiflora rose. There are also some autumn-olive on the east side of the drainage.

PRESCRIPTION – The priority for management for wildlife is 3. Kill any autumn-olive. In order of priority: 1. release the swamp white oak giving them 10 to 20 feet of space to favor acorn production 2. release the bur oak for mast and regeneration – leave any shagbark hickory which is competing with a bur oak 3. kill all honey locust and white elm 3 inches d.b.h. and larger 4. kill any shingle oak which is competing with the crown of a black oak.

STAND 9 – 6.8 ACRES

The stand is near the head of the drainage which goes through stand 8. It is dissected by gullies which are 10 to 20 feet deep. The soil type is Keswick loam. The slope percentage varies from 5 to 9% upslope to some very steep short slopes near the gullies. Shagbark hickory comprises 10 to 25% of the stem count. White oak, red oak, black oak, shingle oak, bitternut hickory, white elm, red elm and honey locust each comprise less than 10% of the stem count. There are also some black cherry and white ash and a few bur oak and boxelder, and at least 6 swamp white oak 6 to 10 inches in diameter. Stem size ranges from 3 to 22 inches d.b.h.; most are between 6 and 11 inches. The average basal area is 110 square feet. The understory is moderately thick and 2 to 4 feet tall with coralberry, gooseberry, multiflora rose and some chokecherry. At the north end of the stand there is also tall prickly-ash and some hazelnut. The regeneration is bitternut hickory.

PRESCRIPTION – The priority for management for wildlife is 2. Kill any ash or white elm which are 5 inches d.b.h. or larger. Release in order of priority: 1. swamp white oak and good-quality cherry 2. white oak 3. red oak 4. bur oak and poor cherry.

STAND 10 – 25.0 ACRES

Stand 10 lies on a long north/south ridge and most of the slopes to the west and east of the ridge. The soils on the ridge is Weller silt loam, 5 to 9% slope and Keswick loam, 5 to 9% slope, with Lindley loam, 14 to 24% slope down slope. White oak comprises

more than 25% of the stem count, shagbark hickory comprises 10 to 25%, and bur oak, black oak, shingle oak and bitternut hickory each comprise less than 10% of the count. The white oak range in size from 3 to 22 inches d.b.h.; most are between 8 and 15 inches. The basal area ranges from 80 to 140 square feet; the average is 110 square feet. The understory is sparse and short with coralberry, gooseberry, prickly-ash (there are some colonies of p-ash) and some multiflora rose and chokecherry. The regeneration consists of small white elm, shagbark hickory and white oak seedlings with some shingle oak seedlings and a low number of black oak seedlings. The white oak seedlings are not evenly distributed. There are also white elm and shagbark hickory saplings present.

PRESCRIPTION – The priority for management for wildlife is 2. Release the few old white oak for mast, regeneration and roosting. Also, release the black oak at the north end and the bur oak for mast and regeneration. Where oak regeneration is present, kill any non-oak saplings and any bitternut hickory or shingle oak. Make 2 or 3 openings for wildlife/regeneration at least 100 ft. X 100 ft. dripline to dripline. If it is necessary to kill some nonmerchantable white oak less than 16 inches d.b.h. to make the openings, kill them unless they exhibit good acorn production.

STAND 11 – 5.1 ACRES

Stand 11 lies on Lindley loam soil on a northwest-facing, 14 to 24% slope above a major drainage which empties into the watershed structure. Shagbark hickory and black oak each comprise 10 to 25% of the stem count. White oak, bur oak, shingle oak, white elm and red elm each comprise less than 10% of the count and there are a few red oak, bitternut hickory, black cherry and hawthorn. The stand is mainly saplings and poles with a few small to medium-size sawtimber trees. Most dominant/codominant stems are between 6 and 10 inches d.b.h.. The understory varies from sparse to thick – it contains coralberry, gooseberry, prickly-ash (including some colonies) and some fragrant sumac and St. Johns-wort. The regeneration is black and shingle oak saplings and seedlings and small white oak seedlings.

PRESCRIPTION – The priority for management for wildlife is 2. Kill any white elm 5 inches d.b.h. and larger. Release 25 to 30 trees per acre in order of priority: 1.red oak 2. cherry 3. bur oak 4. shagbark hickory larger than 12 inches d.b.h. 5. white oak 6. best black oak.

STAND 12 – 2.8 ACRES

The narrow stand is along a drainage on Olmitz-Vesser-Colo complex, 2 to 5% slope. Shingle oak comprises 10 to 25% of the stem count. Bur oak, black oak, shagbark hickory, bitternut hickory, white elm, red elm, walnut and honey locust each comprise less than 10% of the stem count. There are also a few black cherry and white ash. There are all age/size classes but most of the stems are saplings and poles. The understory is sparse upslope and thick in the drainage. It contains coralberry,

gooseberry, multiflora rose, prickly-ash and black raspberry plus one large Amur honeysuckle which is flagged. The regeneration is white elm and white ash.

PRESCRIPTION – The priority for management for commercial products is 4. Kill all honey locust, white ash and white elm 5 inches d.b.h. and larger except for any stems which are holding the banks of the gully. Kill the honeysuckle. Release 25 to 30 trees per acre in order of priority: 1. release and prune walnut and cherry crop trees 2. release other walnut for regeneration and mast 3. release bur oak 4. release good-quality black oak and large-crowned black oak.

STAND 13 – 4.5 ACRES

The stand is on generally west-facing 14 to 24% slopes on Lindley loam soil just upslope from a north/south drainage (Stand 12). Black oak and shagbark hickory each comprise 10 to 25% of the stem count. Bur oak, bitternut hickory, white elm and white ash each comprise less than 10% of the count. There are also some post oak and a few white oak, black cherry and redcedar. Most of the stems are between 3 and 11 inches d.b.h. with some small to medium-size sawtimber. The average diameter is 8 inches; the average basal area is 80 square feet. The understory is sparse and short containing coralberry, gooseberry, fragrant sumac and some black raspberry, multiflora rose and blackberry. The regeneration consists of small white ash, white oak and shagbark hickory seedlings, some small bur oak and black cherry seedlings, and a few small hackberry, black oak and shingle oak seedlings.

PRESCRIPTION – The priority for management for wildlife is 2. Kill any white ash or white elm 5 inches d.b.h. or larger.

The white oak regeneration is common in scattered, small areas. In those areas, kill all stems 1 inch d.b.h. and larger even if the stems are white oak. For the rest of the stand, release approximately 25 to 30 stems per acre in order of priority: 1. white oak, post oak and cherry 2. bur oak 3. good-quality and/or large-crowned black oak

STAND 14 – 2.7 ACRES

Stand 14 is a narrow strip at the lower end of a east-facing slope above a north/south drainage (Stand 12). The soil type is Lindley loam, 14 to 24% slope. Bitternut hickory comprises more than 25% of the stem count. Bur oak, black oak, white elm and walnut each comprise less than 10% of the stem count. There are also a few white oak, red oak, black cherry, white ash and honey locust. Most of the stems are between 5 and 11 inches d.b.h. with some small sawtimber-size trees. The understory is sparse and 2 to 4 feet tall and contains coralberry and gooseberry. There is almost no regeneration.

PRESCRIPTION – The priority for management for both wildlife and commercial products is 2. Kill any white ash or white elm or poor-quality bitternut hickory which are 5 inches d.b.h. and larger. Release in order of priority: 1. release and prune the good-

quality walnut and release the few cherry and red oak 2. large-crowned bur oak and white oak with good-quality surfaces 3. other white oak and poorer-quality walnut. Release about 25 trees per acre.

STAND 15 – 4.3 ACRES

Stand 15 is a narrow stand along a small southwest to northeast drainage. The lower end of the drainage is on Olmitz-Vesser-Colo complex and the upper end is on Lindley loam. It contains mostly bitternut hickory, bur oak, black oak and shingle oak with some honey locust and white ash and a few walnut and white oak. Most of the stems are between 8 and 16 inches d.b.h. with a few up to 22 inches. The understory is coralberry, gooseberry and multiflora rose to 5 feet tall with white ash regeneration.

PRESCRIPTION – The priority for management for wildlife is 3. Kill any ash 5 inches d.b.h. and larger. Release all the walnut and white oak. Release from competing shingle oak and bitternut hickory 15 of the largest bur oak, the 10 best-quality black oak and 10 other larger-crowned black oak.

Fell and buck 10 of the largest ash and bitternut hickory.

Assess the stand for harvest in 10 to 15 years.

STAND 16 – 8.7 ACRES

The stand is on a short ridge and some of the adjoining side slopes. The ridge is on Weller silt loam and Keswick loam, 5 to 9% slope and the side slopes are on Lindley loam, 14 to 25% slope. White oak and shagbark hickory each comprise more than 25% of the stem count and black oak comprises 10 to 25% of the count. White elm and white ash each comprise less than 10% and there are also some red oak and a few red elm and walnut. The stems range from 5 to 16 inches d.b.h. with a low percentage of larger stems; most are between 8 and 14 inches. The basal area ranges from 80 to 120 square feet; the average is 100. At the north end and also the southwest corner of the stand is evidence of old oak wilt mortality. The understory is 2 to 4 feet tall with coralberry, gooseberry, prickly ash, black raspberry and some fragrant sumac. The regeneration is white elm, white ash, bitternut hickory, shagbark hickory, black oak and white oak. The white ash regeneration is common and 1 to 4 feet tall. The white and black oak regeneration is spotty and short.

PRESCRIPTION – The priority for management for wildlife is 2. Release white and black oak regeneration where it occurs, removing all of the overstory down to 2 inches with the exception of leaving any red oak, walnut or old white oak. Release 20 to 30 trees per acre in order of priority: 1. walnut, red oak and old white oak 2. a mix of good-quality black oak poles and larger-crowned black oak.

STAND 17 – 4.9 ACRES

Stand 17 is on a west-facing slope on Lindley loam, 14 to 24% slope and is upslope from a gully. More than 25% of the stand is bitternut hickory with 10 to 25% each, white elm and white ash. White oak, bur oak and shagbark hickory each comprise less than 10% of the stand and there a few red oak at the south end, a few walnut and honey locust and at least one black cherry pole. The stem size varies from 3 to 26 inches d.b.h. with most between 9 and 15 inches. The average basal area is 90 square feet. Some of the white ash have cavities. The understory contains coralberry, multiflora rose and gooseberry with hazelnut at the south end of the stand. The regeneration is bitternut hickory.

PRESCRIPTION – This is a low-priority stand for wildlife management. Kill ash and white elm 5 inches d.b.h. and larger; except for ones with existing or potential cavities as well as any on the edge or at the head of the gully which are holding the gully bank. Release 25 to 30 stems per acre in order of priority: 1. walnut and red oak 2. large white oak and bur oak 3. other white oak and bur oak.

Fell and buck for coarse woody debris 10 of the largest ash or elm.

STAND 18 – 9.5 ACRES

Stand 18 is on a small ridge and the adjoining side slopes. The ridge is on Weller silt loam and Keswick loam, 5 to 9% slope and the northwest and southeast-facing slopes are on Lindley loam, 14 to 24% slope. White oak and shagbark hickory each comprise more than 25% of the stem count with red oak, black oak and white ash each comprising less than 10%. There are also a few walnut. The basal area of the oak and the hickory ranges from 30 to 90 square feet. There are also ironwood seedlings and saplings in the north one-half of the stand. The understory is sparse and short with coralberry, gooseberry, prickly-ash, black raspberry and a few fragrant sumac. The regeneration is white ash and shagbark hickory with some white elm, some white oak and a few red oak plus some ironwood in the north one-half of the stand.

PRESCRIPTION – The priority for management for both wildlife and commercial production is 2. Kill all ironwood and non-oak species 1 inch d.b.h. and larger; except leave alive all walnut and about 25 of the largest shagbark hickory with the largest crowns. Release the few old white oak from any hickory or other white oak. Also, release red oak and some black oak to bring the average total number of trees released per acre to about 25.

STAND 19 – 1.9 acres

The stand lies on Weller and Keswick loam, 5 to 9% slope at the southwest corner of the property. More than 25% of the stems are white oak with 10 to 25% shagbark hickory, less than 10% white ash, a few red oak and at least one black cherry. The

stems range in size from 5 to 20 inches d.b.h.; most are between 8 and 16 inches. The average basal area is 80 square feet. The understory is sparse and 2 to 3 feet tall with coralberry, gooseberry blackberry and fragrant sumac. The regeneration is white elm, white ash, shagbark hickory, white oak and black cherry.

PRESCRIPTION – The priority for management for both wildlife and commercial production is 1. Kill all white ash 5 inches d.b.h. and larger except for any with cavities. Release the red oak and the old white oak but leave any larger shagbark hickory in the process. Release white oak regeneration from shagbark hickory.

STAND 20 – 2.8 ACRES

Stand 20 is on Keswick loam, 5 to 9% slope upslope and Lindley loam, 14 to 24% slope down slope in the southwest corner of the property. Shagbark hickory comprises more than 25% of the stem count with 10 to 25% black oak. White oak shingle oak, bitternut hickory, redcedar, white ash and honey locust each comprise less than 10% of the stand. There are also a few bur oak, at least two red oak, one walnut and one black cherry. Most of the stems are between 6 and 12 inches d.b.h. with some larger oak. The understory is sparse and short with coralberry, gooseberry, blackberry and fragrant sumac. The regeneration is white elm and white ash with some chokecherry and ironwood.

PRESCRIPTION – The priority for management for wildlife is 3 and for commercial production, 2. Leave the large ash on the edge of the road right-of-way alive but kill the other ash, honey locust and white elm 5 inches d.b.h. and larger. Release 25 to 30 stems per acre in order of priority: 1. walnut and red oak 2. bur oak and larger white oak 3. good-quality black oak poles.

STAND 21 – 26.9 ACRES

Seventy-five percent of the stand is on Lindley loam, 14 to 24% slope with 25% on Weller silt loam and Keswick loam, 5 to 9% slope upslope near the road right-of-way and on a small ridge extending from the right-of-way. The stand is mostly white oak with the white oak component varying from 50 to 95% of the stem count. The stem quality of the white oak ranges from fair to good with a fairly low percentage being good quality. White ash, shagbark hickory and bitternut hickory each comprise less than 10% of the stem count. There are also some red oak and a few honey locust, redcedar, bur oak and black oak with a very few black cherry and very few walnut in the draws. Near the right-of-way are some ironwood. The basal area varies from 40 to 140 square feet; the average is 90 square feet. Most of the dominant and codominant white oak are between 10 and 15 inches d.b.h.. There is at least large old white oak in the stand. The understory is sparse and 2 to 5 feet tall with coralberry, gooseberry, black raspberry, blackberry, fragrant sumac and some prickly-ash. The regeneration is white elm, white ash, bitternut hickory, shagbark hickory, white oak, some red oak, chokecherry and a few shingle oak. The white ash is the most common regeneration

and shagbark is the second most common. There is also some ironwood regeneration near the ironwood in the southwest corner of the stand. In some locations, the oak regeneration (mostly 8 to 20 inches tall) is abundant but few of these spots lend themselves to a clearcut regimen because the overstory of white oak contains some good-quality stems which are not economically mature.

PRESCRIPTION – The priority for management for both wildlife and commercial production is 2. Release any large, old white oak. Kill all ironwood 1 inch d.b.h. and larger. Kill all ash which are 5 inches d.b.h. and larger except for those with existing or potential cavities. Release the red oak, black oak and bur oak to balance the species diversity/acorn production. Release about 15 of the largest shagbark hickory from poor-quality white oak; leave the good-quality white oak competing with them.

Where the stand is 80% or greater white oak, reduce the basal area of the white oak and other residual stems to an average of 70 square feet to allow more sunlight to reach the woodland floor. Select for removal white oak which have poor stem quality or other defects.

STAND 22 – 2.0 ACRES

Stand 22 is on north and northwest-facing slopes and along the drainage at the bottom of the slope. The soil type is Lindley loam, 14 to 24% slope. Shagbark hickory and white ash together comprise more than 80% of the stem count with a few white oak, bur oak, black oak and honey locust. The stems range from 4 to 18 inches d.b.h. with most being 9 to 15 inches. The average basal area is 80 square feet. The understory is moderately thick and 2 to 6 feet tall containing coralberry, gooseberry fragrant sumac and some prickly-ash. The regeneration is white elm and white ash; the ash are abundant and 1 to 8 feet tall. Some elm have died of Dutch elm disease.

PRESCRIPTION – The priority for management for wildlife is 2. Burn the stand in late March or early April two years in a row to reduce the ash seedling numbers and kill all of the ash and honey locust down to and including 2 inches d.b.h.. Release the white oak, bur oak and black oak.

Buck and fell 8 of the largest white ash for coarse woody debris.

STAND 23 – 2.0 ACRES

The stand is on the lower part of a southeast-facing slope above a drainage which empties into the watershed structure. The soil type is Lindley loam, 14 to 18% slope. Shingle oak is the dominant species with the percentage of the stem count varying from 70 to 90%. Bur oak, black oak and honey locust each comprise less than 10% of the stem count. There are also a few shagbark hickory and bitternut hickory. The shingle oak range from 3 to 14 inches d.b.h.; most are between 4 and 8 inches. Three or four of the bur oak and shagbark hickory are large trees. The understory is thick and 4 to 9

feet tall containing coralberry, gooseberry, prickly-ash and black raspberry plus shingle oak seedlings and saplings and abundant multiflora rose.

PRESCRIPTION – The priority for management for wildlife is 3. In order of priority:

1. release the large bur oak and shagbark hickory to increase mast production and prolong the life of these trees 2. release other bur oak 3. release the shagbark hickory 4. release 10 of the larger-crowned black oak.

STAND 24 – 4.8 ACRES

Stand 24 is on Lindley loam soils and mostly on south and southeast-facing slopes with a west portion following a drainage upslope. Black oak and shagbark hickory are the dominant species with less than 10 % each of bur oak, shingle oak, white elm, white ash and honey locust. There are also a few white oak and black cherry. The stems are mainly saplings and small poles up to 7 inches d.b.h. with about 10 small to medium-size sawtimber trees per acre. These larger trees are shagbark hickory, white oak, bur oak and black oak. The understory is thin and 2 to 4 feet tall consisting of coralberry, gooseberry, fragrant sumac, multiflora rose and some prickly-ash. The regeneration is white ash, bitternut hickory, white oak, shingle oak and some black oak and bur oak. Most of the regeneration is small – 8 to 20 inches tall.

PRESCRIPTION – The priority for management for wildlife is 3 with the focus on releasing white oak and bur oak for regeneration. Kill ash, locust and elm which are 5 inches d.b.h. and larger. Release in order of priority: 1. white oak – release all white oak 10 inches d.b.h. and larger; release smaller white oak but leave any bur oak or any shagbark larger than 10 inches alive and standing 2. bur oak ; if competing with a black oak or cherry, leave the black oak or cherry.

STAND 25 – 7.9 ACRES

The stand lies on a narrow ridge leading from the right-of-way on east. The ridge divides into two ridges in the east part. The ridge nearer the road is on Weller silt loam, 5 to 9% slope; the ridges in the east part are on Keswick loam, 5 to 9% slope. Sapling to large pole-size black oak and shingle oak each comprise more than 25% of the stem count with shagbark hickory between 10 and 25% and less than 10% each of white elm, black cherry, white ash and honey locust. There are also a few redcedar and at least one pole-size swamp white oak. On the ridge and near the draw splitting the two ridges are some sawtimber-size black oak and shagbark hickory. The average basal area is 80 square feet. The understory is moderately thick and 2 to 4 feet tall with coralberry, gooseberry, black raspberry, blackberry and some multiflora rose. The regeneration is white ash, black oak and shagbark hickory with some shingle oak and a few white oak. White ash is the most abundant. There is some old mortality from Dutch elm disease.

PRESCRIPTION – The priority for management for wildlife is 3 with a good component for hard and soft mast production and an opportunity to develop snags and thick cover. Kill ash, locust and white elm 5 inches d.b.h. and larger. Release the black cherry and the old black oak and shagbark hickory.

STAND 26 – 1.1 ACRES

Stand 26 is on a gradual north slope on Lindley loam soil. Black oak and shagbark hickory each comprise more than 25% of the stem count, shingle oak comprises between 10 and 25%, and white elm, black cherry, white ash and honey locust each comprise less than 10% with a few bur oak. Almost all of the stems are between 3 and 10 inches d.b.h.. The stand has some good-quality cherry and black oak poles and two old black oak. Dutch elm disease has killed some of the elm. The understory is moderately thick and 3 to 4 feet tall. It contains coralberry, multiflora rose and gooseberry with white ash regeneration.

PRESCRIPTION – The priority for management for commercial production is 2 and for wildlife is 3. Kill any ash, white elm or locust 3 inches d.b.h. and larger. Release the two old black oak for roosting and mast. Also, release the bur oak and prune and release the cherry, black oak and shagbark crop trees.

STAND 27 – 7.1 ACRES

Stand 27 is on a southeast-facing slope with Lindley loam soil, 14 to 18% slope upslope and Olmitz-Vesser-Colo complex at the toe of the slope. Much of the stand is open or has a sparse stocking of trees and shrubs. Black oak and shingle oak each comprise more than 25% of the stem count with bur oak comprising 10 to 25% of the count and shagbark hickory, bitternut hickory, white elm and honey locust each comprising less than 10%. There are also some redcedar and hawthorn with a few black cherry and white ash and a few pole-size post oak. Most of the stems are between 3 and 9 inches d.b.h. with some larger shagbark hickory on the edges of the ridges and slopes. Within the portions of the stand which is mostly trees, the understory is moderately thick and 2 to 4 feet tall with coralberry, gooseberry, fragrant sumac and black raspberry. The regeneration is small seedling white elm, white ash, shagbark hickory and bur oak. The semi-open to open areas contain grasses, sedges, mixed forbs, raspberry, gooseberry and some autumn-olive. Dutch elm disease has killed some elms.

PRESCRIPTION – The priority for management for wildlife is 3. Kill the autumn-olive. Kill all of the honey locust and white ash as most of them are competing with more desirable trees. In order of priority: 1. release the old shagbark hickory and the 3 or 4 largest bur oak 2. release the post oak and cherry for regeneration 3. release 15 other bur oak 4. release 15 of the largest black oak for mast and regeneration. Run a late spring burn through the stand for 2 or more successive seasons to suppress woody succession and to see if some prairie species respond. If the fire is allowed to carry

uphill into stands 25, 26 and 29 and north into stand 1 and west into stand 24, it will favor oak regeneration by suppressing elm and ash regeneration.

STAND 28 – 2.2 ACRES

The stand is on Omitz-Vesser-Colo complex soils, 2 to 5% slope and some upslope on 5 to 9% slope on both sides of a drainage which runs southwest to northeast into the watershed structure. Shingle oak, white elm and honey locust each comprise more than 25% of the stem count with black cherry and boxelder each comprising less than 10%. Most of the stems range from 9 to 16 inches d.b.h.. The understory is moderately thick and 3 to 8 feet tall with coralberry, gooseberry, black raspberry, multiflora rose and some hazelnut. This is a low-density stand.

PRESCRIPTION – The priority for wildlife management is 2 or 3 with the emphasis on snag development and thickening up the understory. Release the cherry and boxelder – the cherry for mast and regeneration and the boxelder for small cavity development. Kill the honey locust and leave all which are larger than 8 inches d.b.h. standing if possible.

STAND 29 – 4.9 ACRES

The stand occupies a small ridge adjacent to the right-of-way and most of the northeast, east and south –facing slopes below it. The ridge is on Keswick loam, 5 to 9% slope and the slopes are on Lindley loam, 14 to 24% slope. This is a low-density stand with mostly black oak and shingle oak saplings and small poles with some sawtimber-size shagbark hickory and honey locust. Bur oak, white oak, shagbark hickory, white elm, white ash and honey locust each comprise less than 10% of the stem count. There are also a few hackberry, red elm, black cherry and redcedar and at least one post oak, 15.5 inches d.b.h.. Along the gullies down slope are some older bur oak and white oak. The understory contains coralberry, gooseberry, fragrant sumac, multiflora rose and some black raspberry. The regeneration is shagbark hickory, white ash and shingle oak with some black oak, black cherry and white oak. The white ash regeneration is common in seedling and sapling size. The white oak regeneration is near the older white oak as usual.

PRESCRIPTION – Release in order of priority: 1 .the old bur oak and white oak for mast, regeneration and roosting 2. other white oak; prune and lightly release those which are commercial crop trees 3. 10 each of the larger bur oak and shagbark hickory. Kill all ash 3 inches d.b.h. and larger plus any white elm and locust 5 inches d.b.h. and larger. Fell one half of the elm and locust 10 inches d.b.h. and larger and buck the stems to provide coarse woody debris. Within one year of completing the release and killing, run a late spring fire through the stand. Repeat the burn a second spring if the weather conditions cooperate. The burns will start to suppress the ash and elm regeneration and favor the oak regeneration.

STAND 30 – 4.1 ACRES

Stand 30 occupies a small sloping ridge and side slopes to the west, south and east on Keswick loam upslope and Lindley loam down slope. The stand contains pole-size to large sawtimber shagbark hickory and little else. There are some honey locust and shingle oak saplings and small poles and a few hawthorns with some coralberry and gooseberry.

PRESCRIPTION – Kill all stems 1 inch d.b.h. and larger except for the shagbark hickory and hawthorn. Then, either of two options could be followed. One option is to do nothing more but just allow the understory beneath the thinned canopy to develop into thicker cover for varied wildlife species. Another option is to burn through the stand in late fall for 2 successive seasons to see if any prairie species respond. If a portion or all of the adjacent stand, stand 1 burns, too, it would be okay.

BARNES TRACT SUMMARY OF STANDS

STAND	ACRES	OVERSTORY	TREE SIZE CLASS	PRESCRIPTION	MANAGEMENT SYSTEM	PRIORITY	DATE COMPLETED
1	8.5	oak-hickory	pole timber		Early Successional	HIGH	
2	22.3	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
3	33.5	oak-hickory	pole timber	crop tree release	Even Age	LOW	
4	3.0	elm-ash-locust	pole timber	weed tree removal	Even Age	MEDIUM	
5	3.5	oak-hickory	pole timber	weed tree removal	Even Age	HIGH	
6	3.4	oak-hickory	pole timber	crop tree release	Even Age	HIGH	
7	6.5	oak-hickory	pole timber	crop tree release	Even Age	LOW	
8	8.1	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
9	6.9	oak-hickory	pole timber	crop tree release	Even Age	LOW	
10	25.0	oak-hickory	small sawtimber	weed tree removal	Even Age	LOW	

11	5.1	oak-hickory	pole timber	crop tree release	Even Age	LOW	
12	2.8	oak-hickory	pole timber	crop tree release	Even Age	HIGH	
13	4.5	oak-hickory	pole timber	crop tree release	Even Age	LOW	
14	2.7	oak-hickory	pole timber	crop tree release	Even Age	LOW	
15	4.3	oak-hickory-hackberry	small sawtimber	crop tree release	Even Age	MEDIUM	
16	8.7	oak-hickory	pole timber	crop tree release	Even Age	LOW	
17	4.9	oak-hickory	pole timber	crop tree release	Even Age	LOW	
18	9.5	oak-hickory-walnut	pole timber	crop tree release	Even Age	LOW	
19	1.9	oak-hickory	pole timber	crop tree release	Even Age	LOW	
20	2.8	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
21.0	26.9	oak-hickory	small sawtimber	weed tree removal	Even Age	LOW	
22	2.0	elm-ash-locust	pole timber	prescribed fire	Even Age	LOW	
23	2.0	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
24	4.8	oak-hickory	small sawtimber	crop tree release	Even Age	MEDIUM	
25	7.9	oak-hickory	pole timber	weed tree removal	Even Age	MEDIUM	
26	1.1	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
27	7.1	oak-hickory	pole timber	weed tree removal	Even Age	MEDIUM	
28	2.2	elm-ash-locust	pole timber		Early Successional	LOW	
29	4.9	oak-hickory	small sawtimber	weed tree removal	Even Age	LOW	
30	4.1	oak-hickory	pole timber	prescribed fire	Early Successional	HIGH	

BARNES TRACT HIGHEST PRIORITY PROJECTS

Timber Stand Improvement

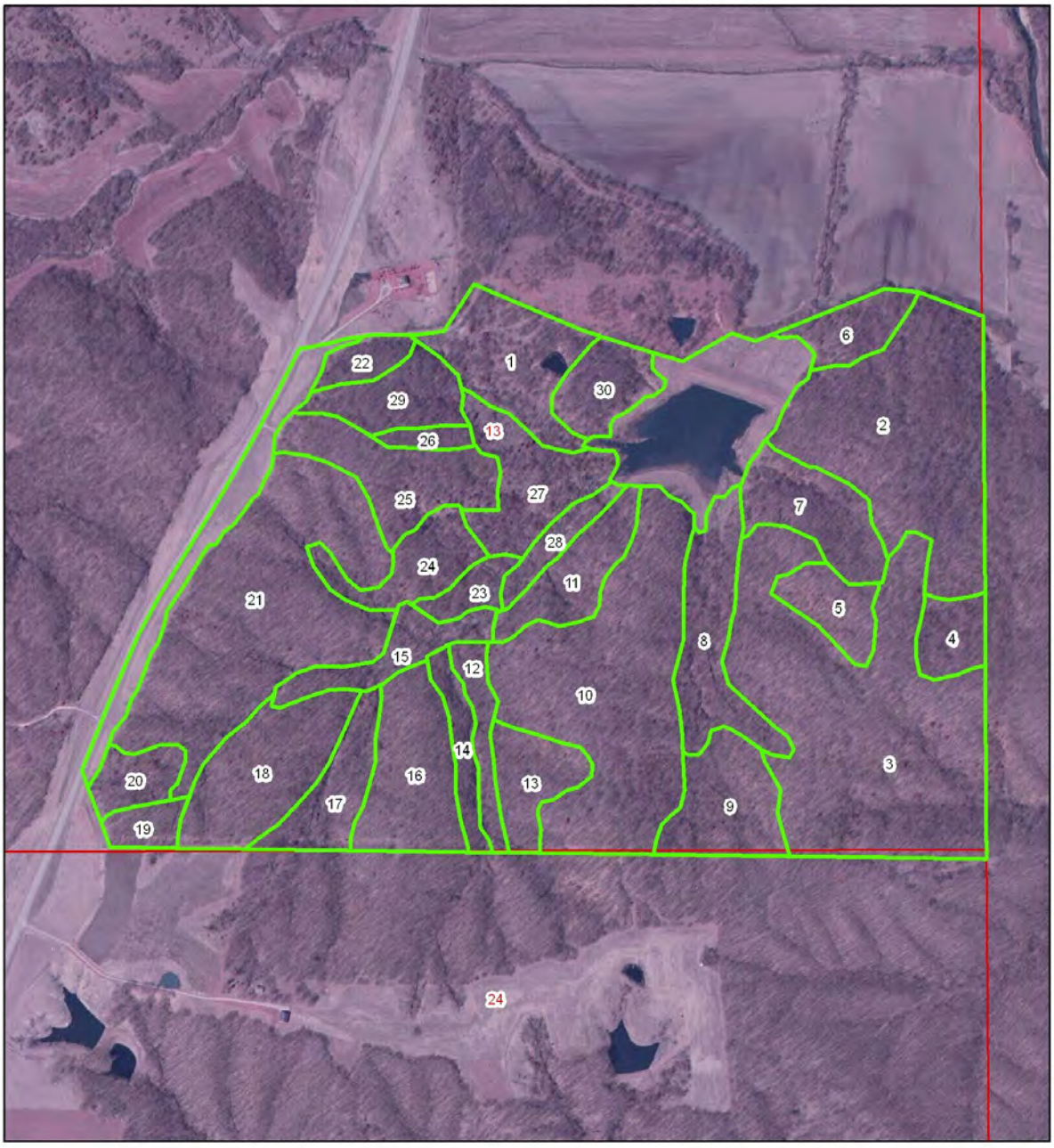
Stand #	Acres	Prescription
5	3.5	weed tree removal
6	3.4	crop tree release
12	2.8	crop tree release

Early Successional Improvement

Stand #	Acres	Prescription
1	8.5	weed tree removal
30	4.1	weed tree removal/prescribed fire

BARNES TRACT HISTORICAL MAPS

Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 2002 **Map prepared: 5/19/2011 by Jeremy Cochran**



Legend
section lines
forest stands

N

1 inch = 660 feet

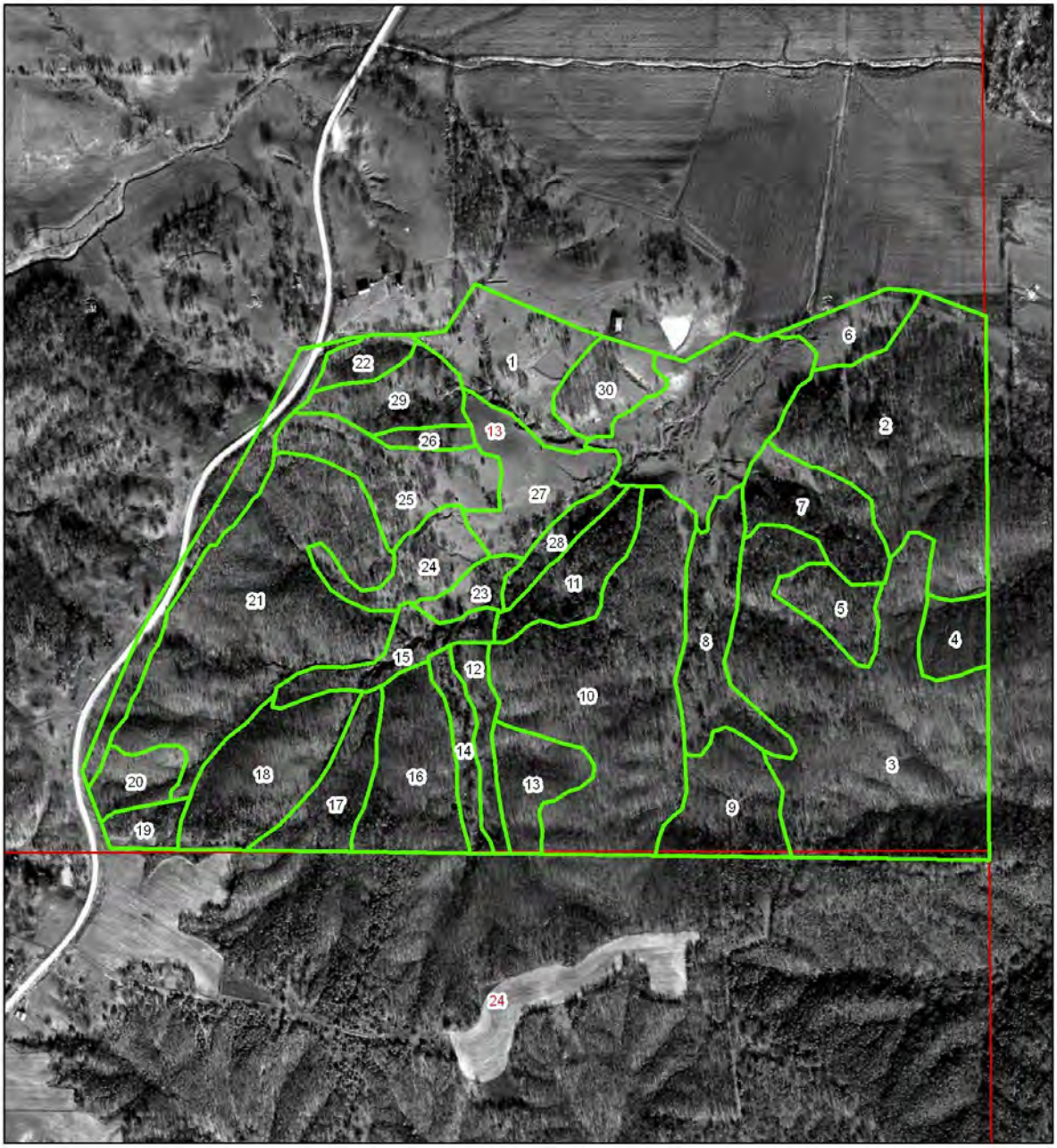
Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 1990 Map prepared: 5/19/2011 by Jeremy Cochran

Legend
section lines
forest stands

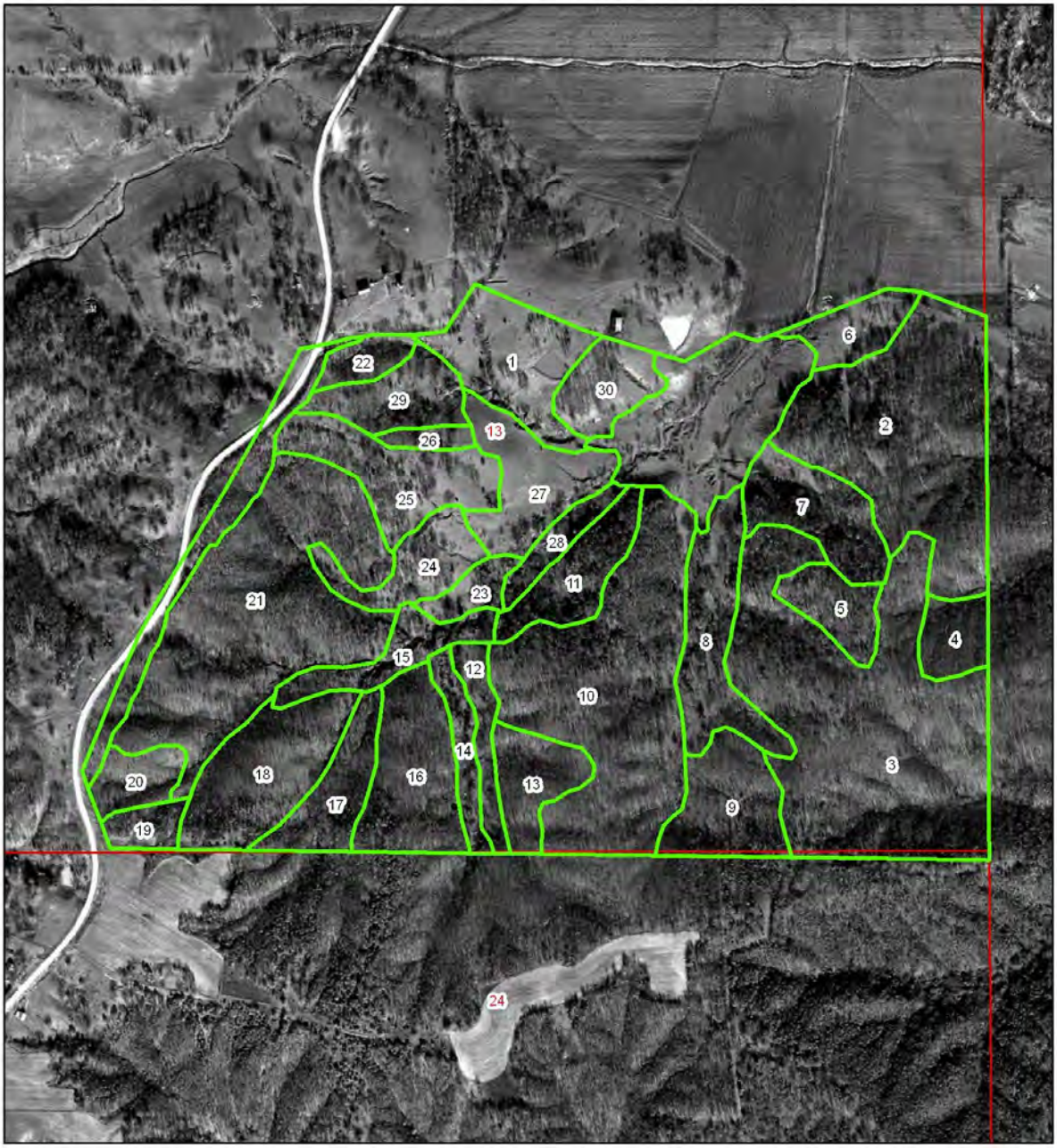
N

1 inch = 660 feet

Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 1960s Map prepared: 5/19/2011 by Jeremy Cochran



Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 1960s **Map prepared: 5/19/2011 by Jeremy Cochran**



Legend
section lines
forest stands

N

1 inch = 660 feet

Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 1950s **Map prepared: 5/19/2011 by Jeremy Cochran**

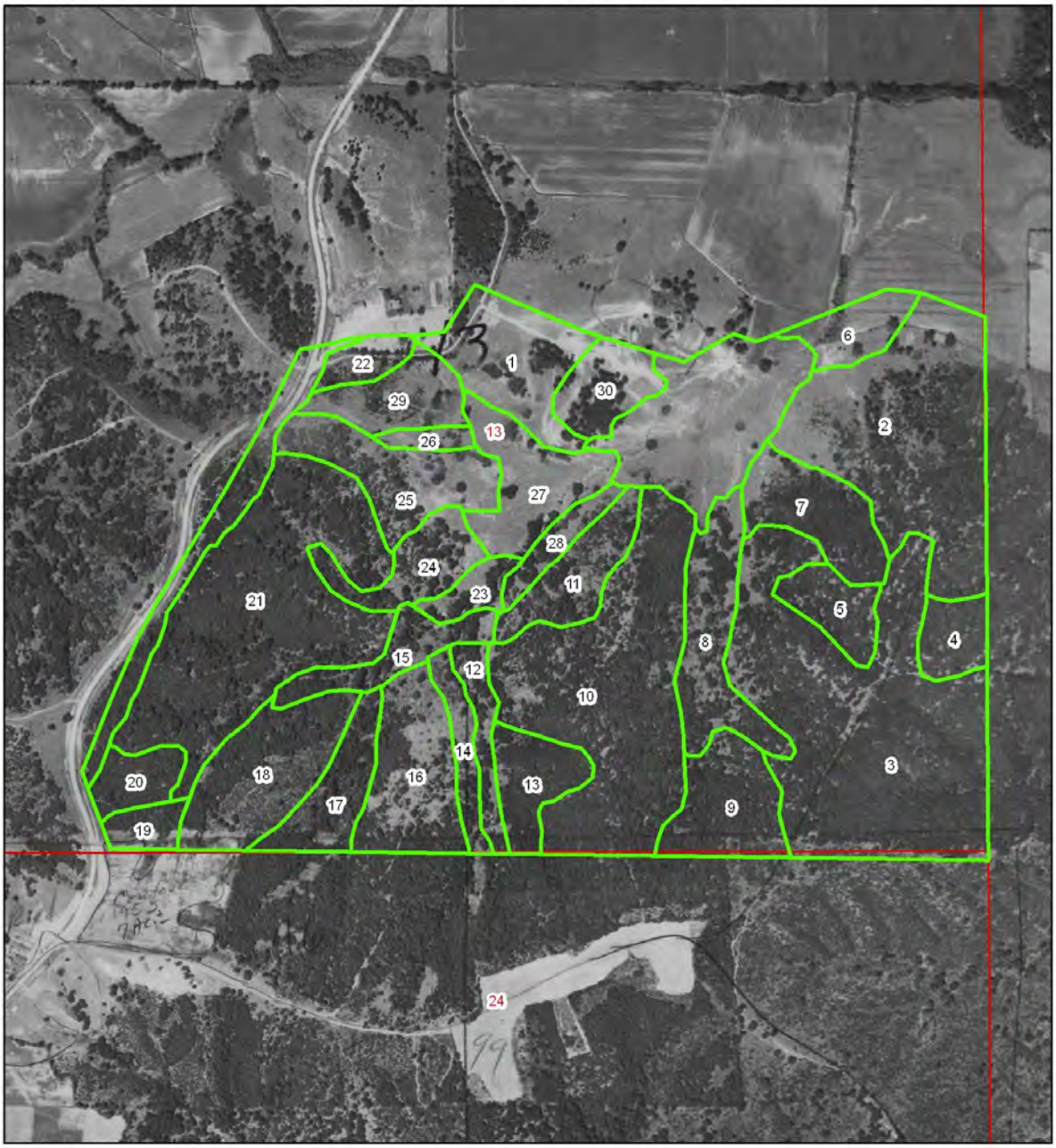
Legend
section lines
forest stands

N

1 inch = 660 feet

Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 1950s **Map prepared: 5/19/2011 by Jeremy Cochran**

Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: 1938 **Map prepared: 5/19/2011 by Jeremy Cochran**

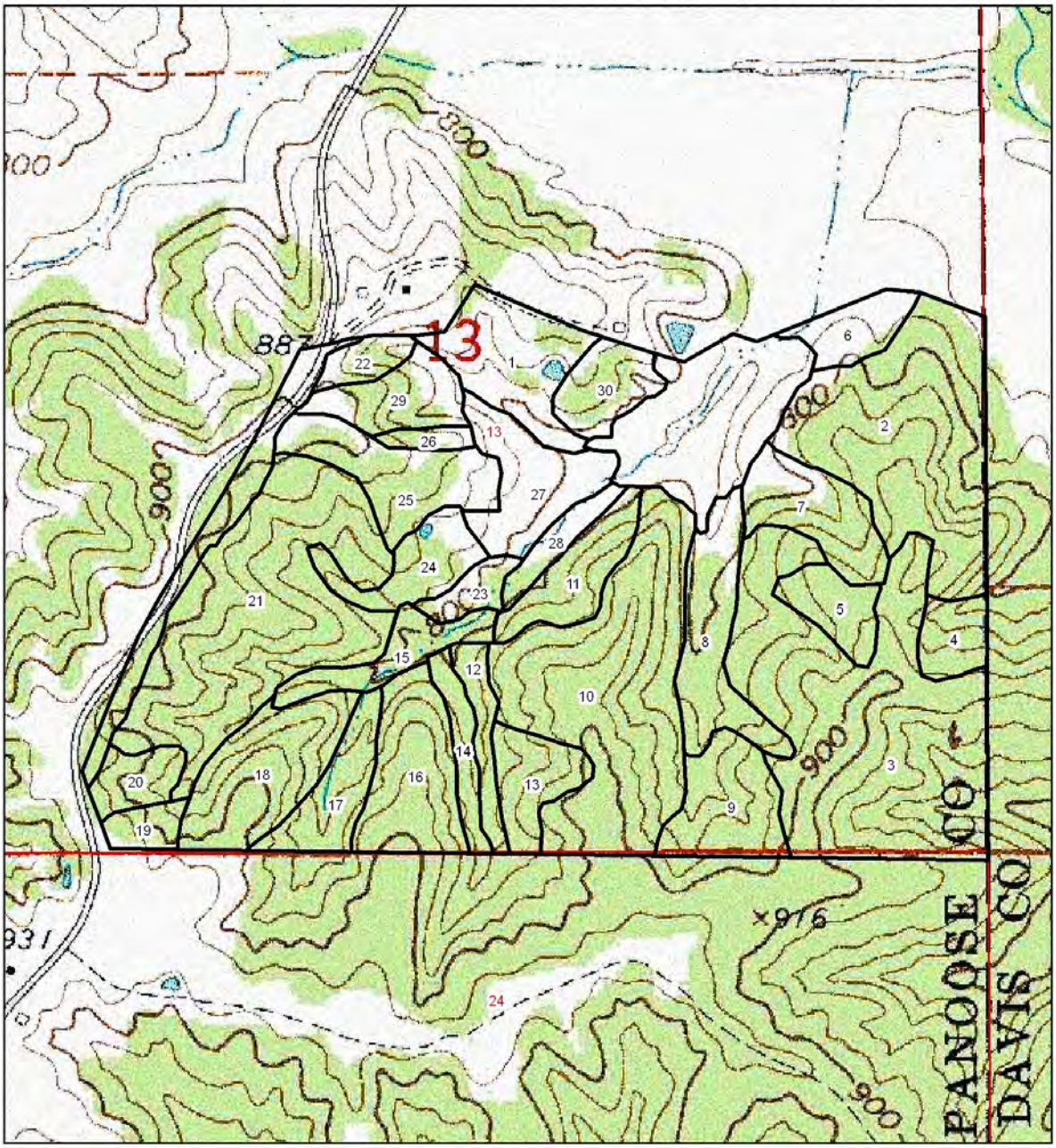


Legend
section lines
forest stands

N

1 inch = 660 feet

Iowa DNR Rathbun Wildlife Unit-Barnes Tract
Location: Union 13 T70N R16W in Appanoose County, Iowa
Image: USGS Topography **Map prepared: 5/19/2011 by Jeremy Cochran**



Legend
section lines
forest stands

N

1 inch = 660 feet

DESCRIPTION OF TUBAUGH WMA

Tubaugh WMA is located in Union township sections 4 and 9, T70N R16W, Appanoose County, Iowa. Direct access to the area is from Appanoose County road, 405th Street, along the north boundary and county road, 303rd Avenue along the northern portion of the west side of the property. The majority of 303rd Avenue is a Class B-minimum maintenance road.

535 total acres

427 acres forestland

90 acres row crop/forage crop

13 acres open/non-cropland

4 acres right-of-way

The Tubaugh WMA was purchased by the Iowa Conservation Commission in 1982 from the Tubaugh Brothers with the use of federal aid money through the federal aid project, W-128-L. Most of the tract is on moderately to steeply-sloping ground covered with woodland vegetation. The tract is dissected by Buzzard Creek, a tributary of Soap Creek.

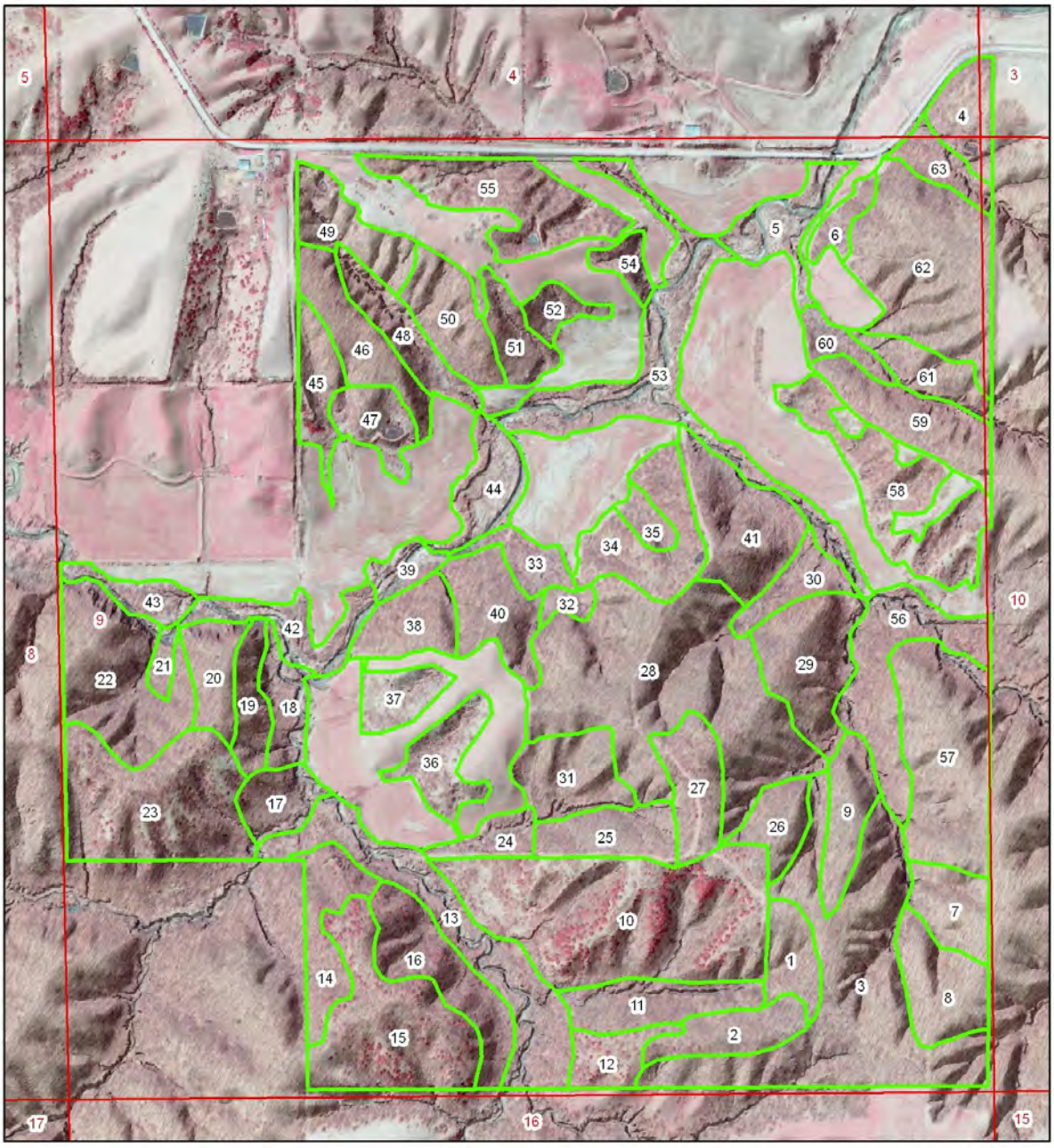
The majority of the bottomland adjacent to Buzzard Creek and its tributaries is managed as cropland which is leased to local farmers for both forage and row crop production. The balance of the bottomland is in bottomland hardwoods comprised of mostly boxelder, cottonwood, walnut and American elm.

Most of the woodland resource is in the upland or sloping ground above the bottom. The most abundant species in the upland are the oaks and hickories. Shingle oak and black oak with shagbark and bitternut hickory and American elm are the dominant species in most of the upland stands. There are some stands dominated by shagbark hickory with mixed oaks. There are also stands dominated by white oak or which have a good mix of white, black, red and bur oak along with hickory. A good diversity of species exists in most of the stands though some species comprise a very low percentage in some stands.

For purposes of this FWSP, Tubaugh forestland was divided into 63 stands shown in the stand map on the following page. Each stand is described in this plan and recommendations are outlined for woodland management by stand. A priority level has been established for each stand recommendation to assist in management decisions.

TUBAUGH STAND MAP

Iowa DNR Rathbun Wildlife Unit-Tubaugh Tract
Location: Union 4, 9 T70N R16W in Appanoose County, Iowa
Image: 2009 **Map prepared: 5/19/2011 by Jeremy Cochran**



Legend
section lines
forest stands

N

1 inch = 742 feet

Current distribution of tree size classes at Tubaugh

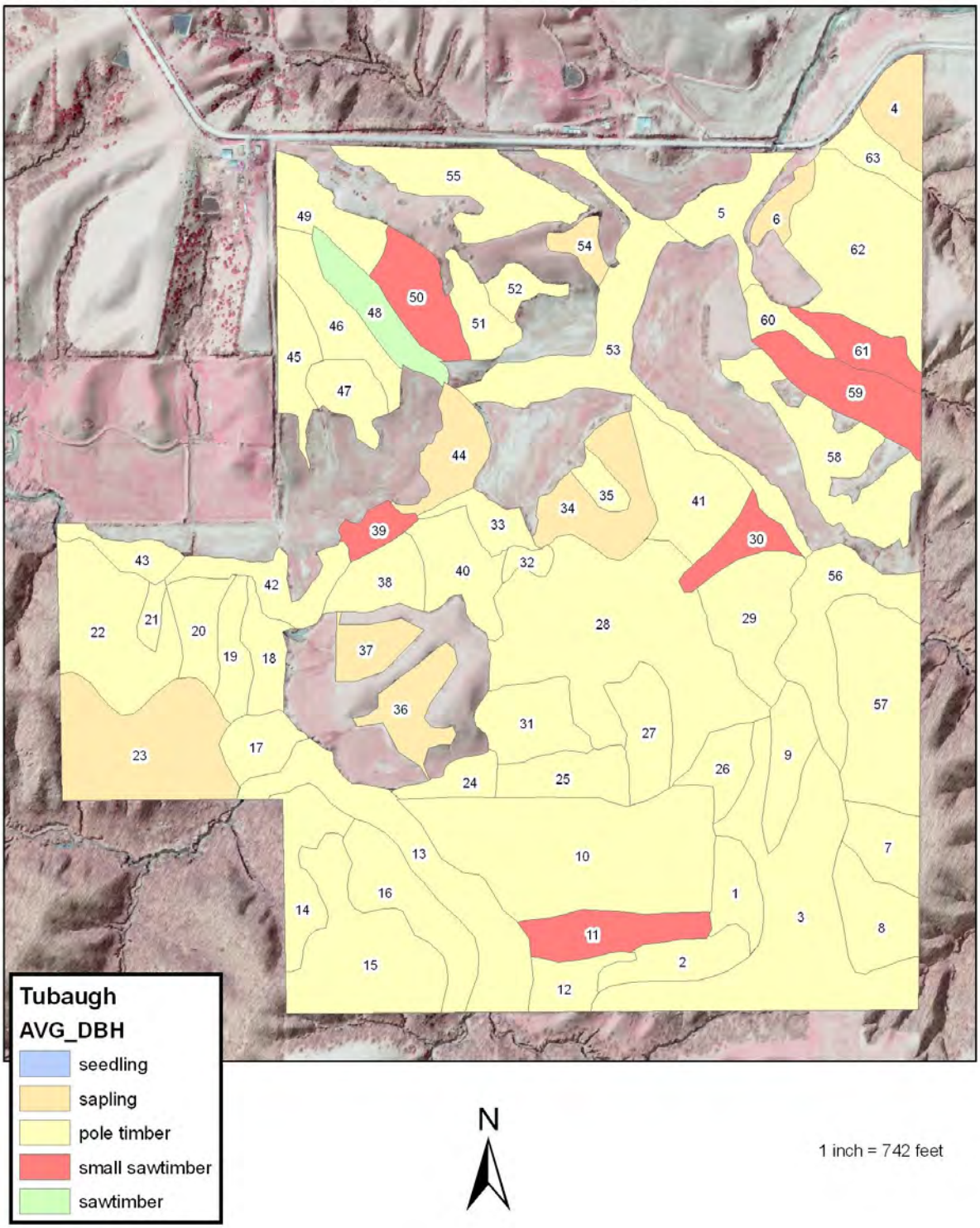
Size Class	Acres	Percent of total forest
Seedling (0-1” dbh)	0	0
Sapling (1-4” dbh)	44	10%
Pole (4-12” dbh)	350	82%
Small sawtimber (12-18” dbh)	28	7%
Sawtimber (18” and larger)	5	1%

Proposed management systems at Tubaugh

Management System	Acres	Percent of total forest
Even-aged	330	77%
Early-successional	97	23%

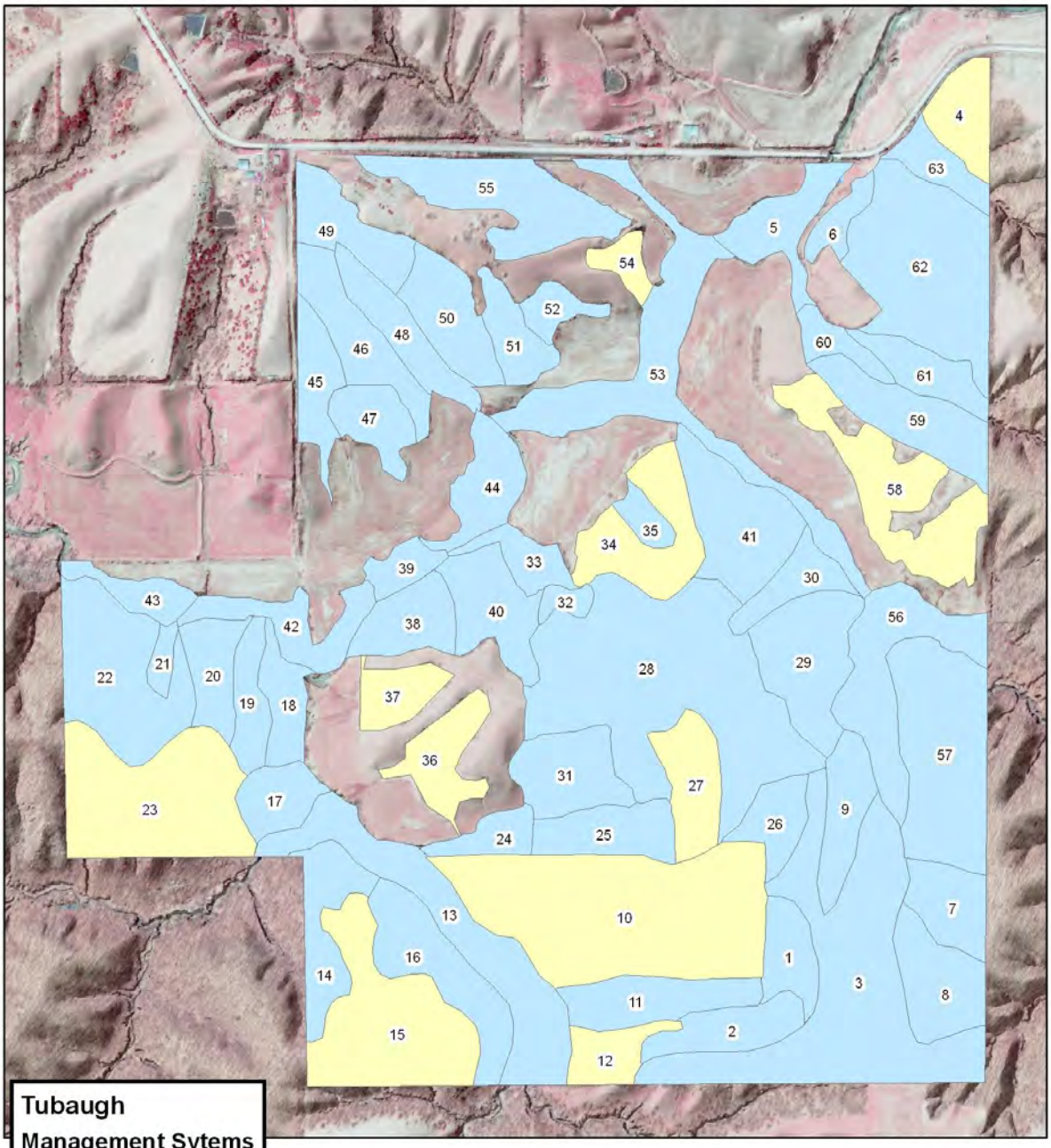
TUBAUGH SIZE CLASS MAP

Iowa DNR Rathbun Wildlife Unit-Tubaugh Tract
Location: Union 4, 9 T70N R16W in Appanoose County, Iowa
Image: 2009 **Map prepared: 5/19/2011 by Jeremy Cochran**



TUBAUGH MANAGEMENT SYSTEM MAP

Iowa DNR Rathbun Wildlife Unit-Tubaugh Tract
Location: Union 4, 9 T70N R16W in Appanoose County, Iowa
Image: 2009 **Map prepared: 5/19/2011 by Jeremy Cochran**



TUBAUGH WORK PLAN

The work plan for Tubaugh is designed to aid officials and foresters in the implementation of forest management practices. It is written with the understanding that these professionals have a basic understanding of forest management principles and techniques. Every detail has not been outlined in the plan because the plan would become too long to be of practical use. This plan is intended to get work accomplished on the ground.

STAND 1 – 3.6 ACRES The stand is mainly shagbark hickory 6 to 12 inches d.b.h. and black oak 9 to 14 inches d.b.h. with white oak, white elm, white ash, black cherry (each of these 4 species comprise less than 5% of the stand) with a few hackberry and bur oak. It lies mainly on Weller silt loam, 2 to 5% slope with Keswick loam, 5 to 9% down slope at the head of the drainage. The basal area ranges from 60 to 130 sq. ft. with an average of 100. Some short-bole white oak sawtimber is scattered through the stand. The principal understory shrubs are coralberry, gooseberry and prickly-ash with a little bit of multiflora rose. The regeneration is almost all white ash and white elm.

PRESCRIPTION – The priority for managing the stand for wildlife is 3. Release in order of priority:

1. the scattered white oak sawtimber and 2. the other white oak, the few bur oak and relatively straight cherry with good crowns. Kill all white elm and white ash 5 inches d.b.h. and larger except for any ash which has or may develop a usable cavity. Leave standing all killed stems which are 9 inches d.b.h. and larger. Make „openings" around the old white oak about 100 ft. X 100 ft. edge to edge to favor any white oak regeneration which exists or may develop – at the same time, note desirable stems which crowd these oak (such as young white oak or bur oak or good cherry) and leave them alive and standing. Within these openings, kill all stems 1 inch in diameter and larger except leave alive any white oak or bur oak.

STAND 2 - 4.5 ACRES

Stand 2 is on a ridge and slight side slope. The soil type on the ridge is Weller silt loam, 2 to 5% slope and the side slope is on Lindley loam. It is a stand of black locust which range up to 16 inches d.b.h.. Most stems are between 8 and 14 inches. There are also white elm in the stand with some red elm, bitternut hickory, a few shagbark hickories and at least one good-quality walnut. A fair number of the black locusts have cavities.

PRESCRIPTION – Work should be completed on this stand before work is completed in adjacent stands in order to make it more practical to control any black locust root suckers which may develop in adjacent stands after the Stand 2 project is completed. The priority for management for wildlife is 2. Kill all of the black locust stems of any size and white elm 2 inches d.b.h. and larger. The felling and frilling should be completed during the period from August through October to maximize the uptake of chemical used to treat the cut stump. Leave standing any killed locust which has a cavity. Leave other killed stems standing as

much as is practical considering their diameters so as to facilitate the scarifying of the site in preparation for direct seeding mixed hardwoods into the site. Broadcast sow and turn under 2 bushels of bur oak, 1 bushel of white oak, ½ bushel of red oak and 1 bushel of walnut per scarified acre. Black cherry, shagbark hickory and wild plum could also be added to the seeding.

STAND 3 - 25.7 ACRES

Stand 3 is partly on a long ridge and partly on side slopes. The soil type on the ridge is Weller silt loam, 2 to 5% slope and the types on the side slopes are Keswick loam, 5 to 9% slope and Lindley loam, 18 to 24% slope. The stand is mainly white oak, black oak, shagbark hickory and white ash with some red oak and bitternut hickory and a few cherry, basswood and bur oak. The majority of the white and black oak are large poles to small sawtimber size and most of the shagbark are poles. Through the stand, most stems of all species are between 10 and 16 inches d.b.h.. The basal area ranges from 80 to 140 sq. ft.. The understory shrubs are mainly coralberry and gooseberry with prickly-ash present in spots. The regeneration is white ash, white elm and bitternut hickory with some short black oak seedlings. Maiden hair fern is common down slope on the north and east-facing slopes.

PRESCRIPTION – The priority for management for wildlife is 3. Fell a total of about 20 ash which are 12 inches d.b.h. or larger for some coarse woody debris on the woodland floor. Check ash for cavities before killing and leave alive any which have cavities. Select these ashes randomly through the stand. Kill the remainder of the ash which are 5 inches d.b.h. and larger - leave killed ash 9 inches and larger standing for snags. Besides developing habitat, this work will reduce the ash seed source.

In addition to killing ash, release about 15 stems per acre in order of priority: 1. bur oak, 2. red oak and good-quality cherry, 3. white oak with good-quality stems and 4. black oak. Killing the ash and releasing 15 stems per acre will open up the canopy and allow more light to reach the understory. 15 stems per acre is an average spacing of 54 feet between released trees. The stand should be rechecked next summer to determine how much white oak regeneration will result from the good white oak acorn crop in the fall of 2008. Areas with common white oak seedlings may warrant additional overstory removal depending upon the species composition and size of the overstory. Very few of the oaks are economically mature. In about 5 years, re-evaluate the stand for harvest potential of the oak and hickory. If a harvest is warranted based on volume and market conditions, the regeneration should be assessed again to determine where shelterwood cuts should be completed and where clearcuts should be completed to favor oak regeneration.

STAND 4 – 4.1 ACRES

The majority of the stand is on southwest, west, and northwest slopes near the road. Stem size ranges from 1 to 26 inches. At the top of the slope adjacent to the fence, the soil type is Keswick loam, 5 to 9% slope. The balance of the stand is on Lindley loam, 18 to 24% slope. The stand is mostly sapling to small pole-size white oak, shingle oak, black oak and shagbark

hickory with open areas and areas of seedlings. Other species are bitternut hickory (mostly in the northwest corner) and some Russian mulberry, a few black cherries, redcedar, Ohio buckeye and some cottonwood by the road. Most of the larger stems are down slope along the road and above the drainage. There are some white oak sawtimber-size trees along the east fence and several more scattered through the stand. The understory is light and short with coralberry, gooseberry and some hazelnut, black raspberry and blackberry. The regeneration is mainly shagbark hickory, white oak, shingle oak and black oak.

PRESCRIPTION – The priority is 2 for management of the stand for wildlife. Release the white oak, both young and old, to increase acorn production for wildlife and regeneration and enlarge and thin the open and semi-open areas by killing all the bitternut hickory and elm in those areas. This will favor the recruitment of oak regeneration.

STAND 5 – 4.9 ACRES

Stand 5 lies along Buzzard Creek on Nodaway alluvial soil complex. It is mostly cottonwood, willow and boxelder with some shingle oak and a few green ash and walnut. The stem size is mostly saplings and small poles up to 8 inches d.b.h. with some cottonwood saw.

PRESCRIPTION – This is a low-priority stand for both wildlife and wood products. Kill 1 or 2 of the larger cottonwood for snags, release the cherry and walnut (prune the commercial cherry and walnut) and release about a dozen shingle oak for mast concentrating on ones with full crowns.

STAND 6 – 1.9 ACRES

The stand is at the toe of a 9 to 18% west and northwest-facing slope on Keswick, Lindley and Mystic soils. The composition ranges from grassy sites with shrubs and seedlings to sites with saplings and small poles. The species are bitternut hickory, shingle oak, black cherry and white elm. Shrubby St. Johns-wort is common along with blackberry and some multiflora rose.

PRESCRIPTION – This is a low-priority stand for wood products. For wildlife mast and regeneration, release shingle oak and cherry growing on the edge of openings. Kill the white elm which are 5 inches d.b.h. and larger to put some material on the ground, remove the seed source, and let more sunlight reach the understory.

STAND 7 – 4.4 ACRES

Stand 7 is approximately 80% white oak on varied aspects with about 20% red oak, white ash and black oak with a few shagbark hickories. The soil type against the east fence is Weller silt loam, 2 to 5% slope with Lindley loam, 14 to 24% down slope. Most of the dominant and codominant trees are between 9 and 15 inches d.b.h. The basal area averages 120 square feet. The understory shrubs are fragrant sumac and gooseberry with some prickly-ash.

PRESCRIPTION – To better balance the species diversity in the stand, release the few shagbark hickory (do not kill red oak or good-quality white oak in the process) and release about four red oak and four black oak per acre (do not kill hickory or good-quality white oak in the process). Kill any white ash which are 5 inches d.b.h. or larger. When releasing red oak, favor the good-quality stems. In about 5 years, reassess the stand for a possible harvest and assess the regeneration. If a harvest is warranted based on volume and market conditions, it could be joined with the sale of stumpage in stand 3.

STAND 8 – 6.1 ACRES

Stand 8 lies on a ridge and on slopes dropping off to both the northwest and southeast of the ridge. The soil type on the ridge is Weller silt loam, 2 to 5% with Lindley loam, 14 to 24% on the slopes. The stand is white oak and white ash with a basal area ranging from 60 to 90 square feet. In some parts, the ash comprises about 50% of the basal area. Most of the stems are between 8 and 14 inches d.b.h.. The white oaks are generally of poor quality. There is a nice 11-inch diameter cherry pole west of the lane in the north ½ of the stand. The understory has coralberry and gooseberry with a little rose.

PRESCRIPTION – The priority is 3 for management for wildlife. This stand lends itself well to combining snag development and coarse woody debris development with site preparation for the natural regeneration of white oak. Kill all of the ash down to 5 inches d.b.h. checking first for existing or potential cavities. Leave alive any ash with existing cavities. Of the killed ash larger than 12 inches, fell 50% of them for coarse woody debris and leave the other 50% standing as snags.

Where removal of the ash alone does not lower the basal area to 50 square feet, select out other species (even poor-quality white oak less than 14 inches) to kill to get the b.a. 50 square feet per acre. The high percentage of white oak in most of the stand favors the regeneration of white oak and these removals will enhance it. Also, lightly release the good cherry pole 5 to 10 feet on all four sides.

STAND 9 – 4.6 ACRES

Stand 9 is about 70% shagbark hickory with white oak, black oak and white ash, a few bitternut hickory and cherry and at least 1 red oak pole. It lies on a long sloping ridge with some west, north and east-facing slopes. The soil on the ridge is Keswick loam, 5 to 9% with Lindley loam, 14 to 24% down slope. There are some shingle oaks at the north end of the ridge. Most of the shagbarks are small to medium poles (5 to 9 inches d.b.h.). The shrub component is coralberry, gooseberry, prickly-ash and fragrant sumac. The regeneration is white ash and white elm saplings.

PRESCRIPTION – The priority for management for wildlife benefits is 3. It is low priority at this time for management for commercial purposes.

Release the few white oak sawtimber trees (poor quality) to increase acorn production and prolong their lives. When releasing them, kill all stems within about 100 feet of the dripline except for white oak and black oak and cherry. If any specimens of those three species within the100 feet have good surfaces, leave them crowded (boles shaded) by other live stems. The large openings around the old oak will favor the establishment of white oak regeneration.

Release all of the other white oak and the black oak and cherry. Make openings as large as possible between oaks or cherries but be sure, again, to leave shaded the boles of trees with good surfaces.

To reduce the seed source of the two species and to develop some snags and ground cover, kill all white elm and white ash 5 inches d.b.h. and larger except for specimens with cavities. Also, leave alive and standing any elm or ash which is needed to shade the bole of a good-quality oak or cherry.

Fell a total of about 10 ash/elm which are 12 inches d.b.h. and larger for coarse woody debris.

Leave all killed shagbark hickories which are 9 inches d.b.h. and larger standing as snags.

STAND 10 – 26.4 ACRES

The bulk of this site is in an early state of succession; the majority of it was open ground 25 years ago and some of it is still open. At the northeast corner, the soil type is Weller silt loam with a 2 to 5% slope. Proceeding to the south and west, the soil is Keswick loam, 5 to 9% slope and down slope the soil is Lindley silt loam, 9 to 24% slope. A small portion of the west end lies on Olmitz-Vesser-Colo complex.

The stems are larger in and upslope from the draws with black oak, shingle oak, white ash, white elm and some walnut, cherry, cedar and white oak. The black oaks are the largest in general. Upslope from the draws, most of the stems are between 4 and 8 inches. There are some good-quality walnut poles and lots of shrubby St. Johns-wort. There is some multiflora rose in the stand.

Farther upslope and on the ridges and upper flat, the mix is cedar with hardwoods and shrubs mixed with forbs, sedges and grasses. Most of the stems are less than 25 feet tall. The species are mostly cedar, white elm, shingle oak, black oak, cherry, walnut and bitternut hickory with goldenrod common in spots. The shrubs are hazelnut with some silky dogwood, wild plum and with blackberries and black raspberry.

PRESCRIPTION – This is a high-priority stand for management for wildlife because it presents a chance to maintain a good-sized area as early-succession habitat and to favor some cedar for songbird nesting and winter protection for a variety of species. Some of the walnut and oak have potential for commercial production.

In and just upslope from the draws, prune and release the good walnut poles. For cedar with full crowns, release them from competing hardwoods (give them 10 feet on average) except

leave any white oak or walnut which are competing with cedar. Kill ash and white elm 5 inches d.b.h. and larger to open the site up and eliminate the seed source.

Farther upslope and on the ridges and upper flat, release the cedar. To retain a semblance of early succession, kill about ½ of the tallest trees every 10 years leaving the cedar alone and leaving alive and standing black oak with full crowns for mast and walnut stems which have commercial potential. Leave the boles of any such walnut shaded to reduce epicormic branching.

Where prairie species are present, brush-cut the entire area in early August a couple of years in a row and then once about every three years after that unless a burning regimen is begun. The timing of the mowing will stress and weaken the woody plants which are invading the prairie sites. It doesn't appear to be a site which would be easy to burn because the south edge and parts of the west edge would be difficult to access with equipment and there are no natural firebreaks unless the drainage in stand 11 and the creek in stand 13 are used as natural firebreaks.

STAND 11 – 5.9 ACRES

The stand is in and along both sides of an upland draw. Almost the entire stand lies on east and north-facing Lindley silt loam with a 18 to 24% slope. The lower part of the stand is on Olmitz-Vesser-Colo complex. The species composition is a fairly even mix of white oak, bur oak, black oak, shagbark hickory, bitternut hickory, hackberry, white elm, red elm and black cherry. Stem size ranges from 6 to 26 inches with most between 8 and 14 inches. The basal area ranges from 60 to 110 square feet per acre with an average of 80 square feet per acre. The understory contains coralberry, gooseberry and fragrant sumac with bitternut hickory regeneration and some multiflora rose. Near where the drainage enters the creek are some cottonwood sawtimber trees.

PRESCRIPTION – The priority for work is relatively low. Fully release the large, old white oak for mast and regeneration and to lengthen their lives. Release cherry for mast and regeneration. Release 3 large-crowned black oaks per acre from competing elm, hackberry and bitternut hickory. Kill 1 cottonwood every 5 to 10 years for large snags.

STAND 12 – 4.5 ACRES

Stand 12 is mostly black oak and shingle oak and white elm with shagbark hickory, red elm, black cherry, walnut, white ash and redcedar. The stem sizes range from 2 inches to 12 inches in diameter; most are between 3 and 6 inches. Almost the entire stand is on Lindley silt loam with south and west-facing 18 to 24% slopes. The understory shrubs and brambles are mostly coralberry, gooseberry, shrubby St. Johns-wort and black raspberry. This is a good, thick sapling/small pole stand with some groups of cedar. It is brushy in some spots, semi-open in other spots and poles 5 to 9 inches in diameter in others. Native forbs exist on some portions of the ridge and slopes.

PRESCRIPTION – A portion of or this entire stand could be maintained in a state of early succession for the varied habitat such a stage provides. To do so, open it up some more by killing the white ash and white elm which are 5 inches d.b.h. and larger, release about 5 to 8 black oak per acre and complete pruning and a light release on walnut crop trees. Release the crowns of cedar groups and full-crowned individual cedar from species other than oak and walnut. In the portions of the stand selected for early succession management, if the prescribed removals have not reduced the crown closure to about 50%, thin some of the shingle oak and black oak. Every 5 to 10 years, return to the stand and reduce the crown closure again where necessary – maintain the diversity of the tree species by favoring the less common species in the stand.

STAND 13 – 13.4 ACRES

The majority of stand 13 lies along both sides of a tributary to Buzzard Creek. The soil type is the Olmitz-Vesser-Colo complex; the slope varies from 2 to 5%. Where the surface drainage is good, the Olmitz and Vesser components are good walnut soils. The whole complex is very productive for silver maple, cottonwood and green ash. The principle species in the stand are black oak, shingle oak, walnut and white elm with some black cherry and red elm and a few red oaks. Stem size ranges from 3 to 12 inches with most stems between 4 and 10 inches. The basal area ranges from 30 to 110 square feet with the average being 95. The low basal area portion lies mainly north of the mid-point of the stand – the trees are mixed with grasses, forbs and shrubs. At about 1/3 of the way north from the south fence is a black cherry 21 inches d.b.h. with a short (13-foot) butt log. There are some large bur oaks along the edge of the small creek. The regeneration is mostly white elm with boxelder. The understory shrubs and brambles are mostly coralberry and gooseberry with St. Johns-wort, black raspberry, blackberry and some hazelnut. The cover is rather thick through much of the stand. There are about 5 cottonwood sawtimber trees at the south end and about 5 more in the middle of the stand. A good number of nice walnut poles are scattered through the stand. There is some rose through the stand and I noted 2 Amur honeysuckles.

PRESCRIPTION – This is a priority 5 stand for commercial purposes because of the good walnut poles. Prune and do a light amount of release of the walnut and cherry pole crop trees. Release the bur oak as well as the few red oak poles which stand on the west side of the creek. Three lumber-grade walnuts could be marketed at this time or they could just be left for seed as they are in good health. Kill a cottonwood in each of the two spots and repeat every 5 years for large snags for pileated woodpeckers. Kill the honeysuckle.

STAND 14 – 5.6 ACRES

Stand 14 is dissected by two minor drainages with slopes facing mostly northeast or southwest with a small portion of the ridge between drainage. The soil type is Lindley silt loam with 18 to 24% slope. Black oak and shingle oak comprise more than 50% of the stand with lower numbers of red oak, shagbark hickory, bitternut hickory, white elm, red elm, black cherry and walnut. The majority of the stems are between 5 and 11 inches d.b.h.. The average basal

area is 90 sq. feet. The understory shrubs are mainly coralberry, gooseberry, fragrant sumac and some gray dogwood and St. Johns-wort plus multiflora rose. In the north end are some good-quality walnut poles and there are a few others scattered through the stand. The red oaks are concentrated in the portion of the stand between the middle of the stand and the south end.

PRESCRIPTION – The priority for commercial management work is 3 in about 1/3 of the stand concentrating on the pruning and release of the good walnut. Release the red oak for regeneration and mast production.

STAND 15 – 13.9 ACRES

Stand is mostly a T-shaped ridge with Weller and Keswick soils on the ridge and gradual slopes (2-9%) dropping off to Lindley soils with a south aspect and 14-24% slopes. The stand is more than 50% black and shingle oak with white ash, white elm, cherry and redcedar. I noted one bur oak pole; there may be more. The ridge is mostly brushy with shingle oak, black oak and white elm with some walnut, red elm and scattered redcedar. The southwest corner is mainly ash, shingle oak and black oak poles.

The basal area ranges from 80 to 120 square feet and the diameter from 3 to 14 inches. The average d.b.h. for the ash is 9 inches and for the rest of the species it is 7 inches. The understory is mainly coralberry and gooseberry with St. Johns-wort, black raspberry, blackberry, fragrant sumac and some hazelnut, silky dogwood and prickly-ash. The regeneration is white ash, white elm and shingle oak. Rose is present along with sericea lespedeza and at least one Amur honeysuckle. Dutch elm disease has killed some white elm.

PRESCRIPTION - The stand is priority 4 for vegetation management for wildlife because of the young stage of growth on much of the site. It could be kept in an early state of succession by releasing the cedar (leaving any walnut competing with them to retain species diversity), killing all the white elm 5 inches d.b.h. and larger (down to 3 inches if there"s enough labor/$) and killing about 2/3 of the shingle oak. Shingle oak will continue to increase in total percentage and killing this many will not reduce the volunteer regeneration by very much as the species regenerates quite readily. Release any bur oak favoring them over any other species as there are so few of them in the stand. In 5 to 10 years, reenter the stand and hit the elm and ash again and release any cedar which needs it. Kill the honeysuckle.

STAND 16 – 8.0 ACRES

The stand lies mostly on Lindley soils with 9 to 24% east and northeast-facing slopes. It is dissected by two small drainages which drain into the small tributary of Buzzard Creek. More than 50% of the stand is black and shingle oak with red elm, scattered walnut and black cherry, a few bur oaks and a few redcedar. The diameters range from 4 to 15 inches with an average range of 6 to 9 inches. The basal area averages 100 sq. feet. The north part of the stand has a lower basal area with less walnut and more cherry than the rest of the stand. The

understory is mainly coralberry and gooseberry, St. Johns-wort, hazelnut, rose and black raspberry. The regeneration is shingle oak with black oak and red elm.

PRESCRIPTION – The southern part of the stand is a priority 5 for commercial t.s.i. – the north part is priority 3. In order of priority 1. prune and release walnut and cherry crop trees, 2. release bur oak for mast and regeneration, 3. fully release the cedar except leave good walnut and cherry and 4. prune and lightly release 5 black oak per acre; select ones with good stem quality.

About 10 years after the release is completed, reassess the stand to determine if any stems released during the first practice need to be released again.

STAND 17 – 3.5 ACRES

The stand is on mostly east-facing 9-24% slopes with Lindley soils with a smaller percentage lying on a narrow bench along the tributary creek. Stand 17 is more than 50% shingle and black oak with white oak, bur oak, white elm, red elm, cherry and walnut with a few hackberry. Stem size ranges from 5 to 16 inches with most being between 6 and 11 inches. The understory is mainly coralberry, gooseberry, rose and black raspberry with white elm and hackberry regeneration.

PRESCRIPTION – This is a priority 4 stand for both wildlife and commercial crop trees. In order of priority, 1. release the 3 old bur oak to retain as roost trees and sources of mast and regeneration 2. release all white oak and prune and release walnut crop trees (leave both if they are competing with one another) 3. release and prune cherry crop trees 4. release other bur oak and walnut (leave both when competing)

STAND 18 – 3.5 ACRES

The stand is mostly on a bench with Olmitz-Vesser-Colo soils. The most common species are walnut and white elm with bur oak, bitternut hickory, red elm, black cherry, green ash, boxelder with some black locust, silver maple and cottonwood and a few Ohio buckeye. The black locust is in a small pocket with white elm at the south end of the stand along with some black oak, shingle oak, walnut, cherry and 1 big bur oak. Diameters range from 3 to 18 inches with a few old sawtimber trees. Most stems are between 6 and 12 inches with the cottonwood being larger. The average basal area is 80 square feet. The understory is coralberry and hazelnut. Dutch elm disease has killed some elms.

PRESCRIPTION - The stand is priority 5 for commercial tree management and 3 for wildlife management. Kill a couple of the largest cottonwood and leave as snags. Kill the boxelder except for stems with cavities. Kill all of the black locust stems regardless of size. Fell the largest 5 green ash for coarse woody debris. Also, 1.release the old oak, 2. prune and do a light release on the walnut crop trees, 3. release the oak, walnut and cherry in the locust pocket and 4. kill all white elm 5 inches and larger.

STAND 19 – 3.3 ACRES

The stand is on 18 to 24% east-facing slope on Lindley soils. The stems are mostly shingle and black oak with some walnut, hackberry, cherry and a few red oak, basswood and bur oak. Most stems are between 8 and 14 inches d.b.h.; the basal area averages 100 square feet. The understory is mainly coralberry, gooseberry and black raspberry.

PRESCRIPTION – This is a priority 2 stand for wildlife management concentrating on balancing out the species composition. Release basswood for cavity development and red oak, bur oak, walnut and cherry for mast and regeneration. When two or more trees of these favored species are competing with each other, leave all of them alive.

STAND 20 – 3.9 ACRES

Stand 20 lays on a ridge and some north and west-facing slopes. The ridge has Keswick soil with 5 to 9% slopes. The slopes are on Lindley loam, 9 to 24% slope. On the ridge are shagbark hickory poles with black oak poles and some red oak, cherry, basswood, bitternut hickory, basswood and a few walnut poles. There are a few nice walnut poles on the east edge of the ridge. On the slopes, the species are of a more even mix and include red and white elm and more bitternut hickory. There is a low number of large, old spreading white oak, red oak and bur oak in the stand. The understory is coralberry, gooseberry, black raspberry, fragrant sumac and some rose.

PRESCRIPTION – The priority for wildlife management is 4 and 3 for commercial crop trees. In order of priority, 1. release the large old spreading oaks, 2. release other white oak, 3. prune and release walnut and cherry crop trees and 4. release other bur oak and red oak. Kill any white elm which are 5 inches d.b.h. and larger.

STAND 21 – 1.1 ACRES

The stand is a small cove on the lower end of a short drainage which enters into Buzzard Creek. The principle species are black oak, shingle oak, bitternut hickory and white elm with some red elm and walnut. Most stems measure between 6 and 11 inches; the average basal area is 110 square feet. The understory is coralberry, gooseberry and rose. The diameter growth rate of some of the walnut is moderately slow because of the soil/drainage characteristics in those portions of the stand where they are growing.

PRESCRIPTION – One sawtimber-quality walnut could be harvested at this time. The stand is medium-priority for commercial crop-tree management – prune and release the walnut crop trees which are 11 inches d.b.h. and smaller.

STAND 22 – 12.1 ACRES

Stand 22 lies mostly on Lindley soils with 18 to 24% slopes and dissected by gullies. There is a small ridge near the west boundary. Black oak, shagbark hickory and bitternut hickory comprise 10 to 25% each of the stem count. Species with less than 10% of the total count include white, bur, red, and shingle oak, hackberry, white elm, red elm, walnut and basswood. There are a few cherry and white ash and a few ironwood seed trees. On the slopes and the west ridge, there are more bitternut hickory than other species while in other locations, black oak outnumbers the other species. The average basal area is 90 sq. feet and most stems are between 6 and 11 inches. The smaller stems are mainly upslope to the south near stand 23. The understory is mainly coralberry, gooseberry, prickly-ash, black raspberry and some fragrant sumac. The regeneration is white elm. There are a few old white oak, red oak and black oak. Several of the old white oak are on the west ridge. Most of the west (boundary) fence is on the ground.

PRESCRIPTION – The priority for management for wildlife is 3 and 2 for commercial crop trees. Kill the ash and white elm 5 inches and larger as well as any damaged or poorly-formed bitternut hickory; check first for cavities. Kill any ironwood 2 inches in diameter or larger. In order of priority, 1. release the large old oak, 2. release white oak of any size as long as the crown is strong, 3. prune and release walnut and cherry crop trees and 4. release red oak poles

STAND 23 – 15.4 ACRES

The stand is younger growth than stand 22. A ridge with gentle slopes comprises about 2/3 of the area with Weller silt loam 2 to 5% slope and Keswick loam 5 to 9% slope. The stand drops off steeply on the south side with Lindley loam on a 18 to 24% slope. More than 25% of the stand is shingle oak with 10 to 25% both white elm and black cherry and less than 10% each of black oak, white ash and redcedar. It is brushy and thick through most of the stand with a few open spots with prairie species. These prairie locations did not display much species diversity during the dormant season but they may be better than they appeared then. A few of the cherry poles are high-quality stems. About 70% of the shingle oak are between 3 and 8 inches d.b.h. with some larger. Some old Dutch elm disease symptoms are present in the stand. The understory is mostly gooseberry, black raspberry and St. Johns-wort. The St. Johns-wort is thick in some places. There are also some fragrant sumac, wild plum and hazelnut with some gray dogwood in a few spots. The regeneration is shingle oak, white elm, and white ash. Sericea lespedeza is present on the site.

PRESCRIPTION - This is a high-priority stand that could be managed to keep it in a perpetual stage of early succession by cutting and burning BUT gaining access for machinery to the site will be difficult. Kill any ash and elm trees over 5 inches d.b.h. to reduce the seed source. Kill all woody stems 1 inch d.b.h. and larger in the prairie locations, expand the perimeters of the spots with prairie species out another 50 feet in all directions. Apply prescribed fire throughout including an additional 100 feet of edge for two successive years. Then burn every third year. Release full-crowned cedar when not in or adjacent to prairie locations. Outside the prairie sites kill by felling and treating or by frilling about 10 % of the largest shingle oak every 5 years.

STAND 24 – 2.5 ACRES

The stand includes part of a drainage running along the north side. Most of the stand is on slopes less than 9%. More than 25% of the stand is white elm. Black and shingle oak comprise 10 to 25% each. There are less than 10% each of walnut, shagbark hickory and bur oak. Most of the stems are between 7 and 12 inches d.b.h. with larger trees being mainly bur oak and white elm. There are four large cottonwoods along the drainage. Most of the trees along the drainage are white elm 10 to 16 inches d.b.h. with walnut and some shagbark hickory. To the south is mostly oak with a few good walnuts and some bur oak.

PRESCRIPTION – This is a priority 5 stand for both wildlife and timber management. Kill one or two of the cottonwood for large snags. In order of priority: 1. release and prune walnut and cherry crop trees 2. release bur oak for mast 3. release and prune good-quality black oak poles 10 inches and less d.b.h. After the oak and walnut release is complete, kill all elms that compete with oaks.

If, after the release work is completed, there are not many felled stems within 50 feet of the field edge, fell enough elm in that zone to make a solid area of fallen tops for cover.

STAND 25 – 5.1 ACRES

Stand 25 is mostly on Lindley soil on a north-facing 18-24% slope. The stand is about 90% shagbark hickory with some black oak, bur oak and white elm. The basal area ranges from 60 to 100 square feet and averages 80. The diameters of the hickory range from 7 to 15 inches with the average being 10 inches. The understory is thin and short with coralberry, gooseberry, fragrant sumac and a little prickly-ash and rose. A few of the bur oak are large and old. There is an old incidence of oak wilt.

PRESCRIPTION – Release all of the black and bur oak. Aim at giving each 30 to 50 feet of space on all four sides of the crown with the exception of leaving alive and standing within that zone the larger hickory 12 to 14 inches.

STAND 26 – 3.4 ACRES

The stand is between two gullies on Lindley soils on 9 to 24% slopes except for the southwest center which is the end of a ridge with 2 to 5% slopes. On the ridge, most stems are 3 to 7 inches d.b.h. while larger stems 7 to 16 inches are at the end of the ridge and down the slopes. Black oak, shagbark hickory and white elm each comprise 10 to 25% of the stand with black cherry, white oak, bitternut hickory and white ash each comprising less than 10%. The understory is short with coralberry, gooseberry, black raspberry, blackberry, fragrant sumac and St. Johns-wort and a few rose. The regeneration is white ash.

PRESCRIPTION – The stand is priority of 3 for management for wildlife. Kill any white elm or white ash over 5 inches d.b.h. Clearcut the center of the ridge (the area with the smaller

stems) leaving alive and standing just the few white oak plus any black oak which are12 inches d.b.h. and larger. In this clearcut, fell any other stems which are 2 inches d.b.h. and larger and chemically treat any non-oak stumps. Also, release from competing hickory any white oak growing on the edge of the clearcut. Release 10 of the largest-crowned white oak down slope from competing hickory or poor cherry.

STAND 27 – 5.2 ACRES

The stand is mostly on a ridge with some gradual side slopes. The soil type on the ridge is Weller loam, 2 to 5% slope. Stand 25 lies on both sides of a woods lane. Black oak, white elm and shingle oak each comprise more than 25% of the total number of stems. There are also black cherry, some hawthorn and a few walnut and white oak. Stems include seedlings, saplings and small poles with some larger poles. There are some prairie crabapples east of the lane – I flagged one of them. The stand is irregular in stem density and brushy. The understory is thick in some parts and includes coralberry, gooseberry, silky dogwood, St. Johns-wort and black raspberry. Generally, the stand is brushy east of the lane and has a high stem count west of the lane. Some elms have been killed by Dutch elm disease.

PRESCRIPTION – The stand is a priority 4 for wildlife management. The stand can be kept in an early stage of succession while favoring hard mast, diversity and a few commercial crop trees. Along the lane, release any bur oak from other species. After releasing bur oak, release any remaining black oak along the lane from the other species. There is one multi-stemmed silver maple east of the lane. Kill it for a snag. Throughout the stand, kill all elm 3 inches d.b.h. and larger. Complete a light release of walnut and cherry crop trees and prune as warranted. Release all other walnut and cherry giving them about 15 feet of space on all four sides. Release 15 large-crowned black oaks throughout the stand. Give any prairie crabapple 15 feet of space on all four sides of their crowns to encourage more fruit production for regeneration.

After all of the prescribed release is completed, wherever the crown closure still exceeds 50% in an area larger than ¼ acre, kill shingle oak to reduce the closure below 50%. At 10 year intervals, reduce crown closure back down to about 50% by killing elm plus any ash or locust which increased in size plus cut, if necessary, any additional shingle oak as is necessary to attain the targeted 50% level.

STAND 28 – 29.7 ACRES

Stand 28 includes two long, connected ridges with steep side slopes dissected by gullies. The soil type on the ridges is Weller loam, 2 to 9% slope and the type on the slopes is Lindley loam, 14 to 24% slope with a small area of Keswick loam. There is a woods lane on both ridges intersecting near the south edge of the stand. Shagbark hickory varies from 50 to 80% of the stem count with black oak comprising between 10 and 25%. There are also white oak, bitternut hickory, white elm, red elm, white ash and black cherry in numbers less than 10% of the count plus a few red oak and basswood. There are several nice pole and small sawtimber size walnuts. The stems range from 4 to 17 inches along with a few large, old white oaks.

Some of the white oaks are small poles stunted by light competition. Most stems are between 7 and 12 inches d.b.h.. The basal area ranges from 60 to 120 with an average of 100. The understory ranges from thin to moderately thick and ranges up to 5 ft. tall. It contains coralberry, gooseberry, prickly-ash, fragrant sumac, black raspberry, blackberry, St. Johns-wort and a little rose. The regeneration is white elm, white ash, hackberry, bitternut hickory and cherry.

PRESCRIPTION – The stand has a management priority of 2 for commercial management and 3 to 4 for wildlife management. On the small ridge just east of stand 27, make a 1-acre opening leaving just the white oak and black oak alive and standing and killing all other stems down to 3 inches d.b.h.. Throughout the rest of the stand, kill all ash and white elm 5 inches d.b.h. and larger except for ones with cavities. In order of priority: 1. release the large white oak, any red oak and release and prune walnut crop trees, 2. release other white oak and walnut and 3. release black oak. Release a total of about 20 trees per acre.

When completing the crown release, fell and buck some of the larger (12 to 16 inches d.b.h.) stems which are to be killed; they will be coarse woody debris. Fell 1 or 2 such stems per acre randomly spaced through the stand.

If, after the release work is completed, there are not many tops laying in the zone within 75 feet of the hayfield at the west end, fell enough hickory in that zone so that felled tops cover approximately 1/3 of the ground in the 75-foot wide area.

STAND 29 – 8.5 ACRES

The stand is off the end of a short ridge between two gullies with Lindley and Keswick soils sloping to the northwest and east. A fence separates the north 25 or so % from the rest of the stand. The composition of the north 25% and the rest of the stand is similar with differences in stem size. South of the fence, black oak and shagbark hickory comprise more than 25% of the total stem count with shingle oak and white ash 10 to 25% each and white oak, red oak, bitternut hickory, white elm, red elm and walnut less than 10% each. North of the fence there are more red oak and no hickory. The stem size ranges from 4 inches to 26 inches with an average of 7 to 10 inches south of the fence and 10 to 17 north of the fence. The understory is thick and 5 to 6 feet tall and contains coralberry, gooseberry fragrant sumac, black raspberry, blackberry and some rose and with white ash and bitternut hickory regeneration.

PRESCRIPTION – The stand has a management priority of 2 for both wildlife and commercial crop tree management.

South of the fence: Release the few walnut and red oak south of the fence for mast production and regeneration. Release about 10 white oak per acre and kill all white ash and white elm 5 inches d.b.h. and larger.

Make an opening about ½ acre in size where the shagbark and shingle oak predominate. In this opening, fell everything smaller than 9 inches d.b.h. and double-girdle all stems larger than 9 inches d.b.h. leaving alive and standing any white oak in the „clearcut". Release from competing hickory any white oak in or near the edge of the opening. North of the fence: Kill

the ash which are 5 inches d.b.h. and larger. Two or three red oak could be harvested now. Throughout the stand, fell and buck 1 or 2 of the largest white ash or elm per acre for coarse woody debris.

STAND 30 – 3.3 ACRES

Stand 30 lies along a tributary of Buzzard Creek and on the first bench and up the drainage that runs from southwest to northeast. Along the tributary are larger basswood, shingle oak, ash and bur oak with saplings and poles including some walnut poles. There are also a few cottonwoods. Up the drainage, white elm predominates with red elm and walnut and hackberry and bitternut hickory. Overall, white elm comprises more than 25% of all stems and red elm and walnut each comprise 10 to 25%. The understory is moderately thick and 3 feet tall and shorter. It contains coralberry and gooseberry with a few rose. The basal area is quite variable. Stem size ranges from 5 to 26 inches with most between 9 and 16 inches. Some openings exist which are the result of elm mortality from Dutch elm disease. There is a total of about 50 walnut stems ranging in size from poles to large sawtimber.

PRESCRIPTION – The priority for management for commercial production is 5 and for wildlife is 3.

Three walnuts could be harvested now. Sever vines on all walnut regardless of quality. Prune and lightly release the commercial walnut poles. Release low-quality or noncommercial walnut for seed production. When releasing any walnut, leave any competing bur oak. Kill 1 or 2 cottonwood for large snags. Kill the ash 5 inches and larger and about 1/3 of the larger white elm to open up the understory to more sunlight and reduce these two seed sources. Fell and buck 1 or 2 per acre of the largest elm or ash for coarse woody debris.

STAND 31 – 6.0 ACRES

The stand is mainly on south-facing slopes on Lindley loam with a 14 to 18% slope. Black oak and shingle oak each comprise more than 25% of the stem count with shagbark hickory 10 to 25%, black cherry less than 10%, and there are a few bur oaks, red oak, white oak, walnut and boxelder plus at least one Russian mulberry pole. The stem size ranges from 4 to 17 inches with most being between 6 and 10 inches. The average basal area is 90 square feet. The understory contains mostly coralberry, gooseberry hazelnut, fragrant sumac, black raspberry, blackberry, some prickly-ash, a few rose and at least one Amur honeysuckle (by the west fence).

PRESCRIPTION – The management priority for wildlife is 3 and for commercial production, 2. Kill the honeysuckle. In order of priority, 1. release and prune walnut and cherry crop trees, 2. release white oak and red oak, 3. noncommercial walnut and cherry, 4. bur oak and 5. black oak. Release a total of about 20 trees per acre.

If, after the release work is completed, there are not many tops laying in the zone within 75 feet of the hayfield, fell more shingle oak so that felled tops cover approximately 1/3 of the ground in the 75-foot wide area.

STAND 32 – 1.1 ACRES

This small stand is on a north-facing slope dissected by a small gully. The soil type is Lindley loam. It is more than 25% bitternut hickory with 10 to 25% shagbark and less than 10% each white oak, red oak, basswood, hackberry, white elm, red elm and walnut. Most of the stems are between 7 and 11 inches d.b.h. with small poles in the understory and with some sawtimber-size bitternut hickory, basswood, white oak and red oak. The understory shrubs/brambles include coralberry, gooseberry and black raspberry. The regeneration is hackberry. The average basal area is 90 sq. ft.. A number of the bitternut hickory were damaged by the December, 2007 ice storm.

PRESCRIPTION – The priority for wildlife is 3 and for commercial production is 2. Kill white elm 5 inches and larger and release the old oak. Release and prune commercial pole-size walnut and release any other walnut, white oak and red oak from competing hickory. Leave any basswood for cavity development.

STAND 33 – 2.8 ACRES

Stand 33 lies on a bench along a tributary on Nodaway alluvial soils and also includes a gradual (5 to 9%) north and northwest-facing slope above the bench. Bitternut hickory comprises more than 25% of the stem count with hackberry, red elm and walnut comprising between 10 and 25%. Bur oak, shingle oak, shagbark hickory and green ash are each less than 10% of the stem count and there a few black oak, too. Stem size ranges from 5 inches to 28 inches with most between 7 and 11 inches with saplings and small poles along the field edge. These saplings and poles are mostly green ash. The basal area ranges from 60 to 110 with an average of 70 sq. feet. There are some ice-damaged trees. The understory is thick and 5 feet tall with coralberry, gooseberry, black raspberry and hazelnut.

PRESCRIPTION – The priority for commercial production is 4 and for wildlife it"s 3. Three walnut could be harvested. Prune and lightly release any walnut pole crop trees. Kill storm-damaged bitternut and release other walnut plus bur oak and black oak to increase seed production. Kill poor-quality ash, hackberry and bitternut to open up the canopy. Treat the 75-foot wide zone next to the agricultural field in the same manner as prescribed for stands 28 and 31 by killing any bitternut hickory, hackberry or green ash in that zone.

STAND 34 – 7.7 ACRES

The stand is on mostly north, west and northwest-facing slopes with Keswick loam upslope and Lindley loam down slope. The main woods lane is the border on the east and southeast

edges of the stand. Slope percentages are 9 to 24%; the slope is dissected by several gullies. Shingle oak comprises more than 25% of the stem count, shagbark hickory and black oak are each 10 to 25%. White elm, red elm, black cherry, bitternut hickory, white ash, honey locust, walnut, and hawthorn are each less than 10% and there are a few bur oak and red oak. The understory is moderately thick and 4 feet tall containing coralberry, gooseberry, black raspberry and some St. Johns-wort. Upslope, most of the stems are between 2 and 7 inches d.b.h. and include shingle oak, black oak, red and white elm, bitternut hickory and some cherry, walnut and honey locust. Next to stand 28, the site contains grasses. A prairie crabapple was marked with flagging.. Down the slope, the stems are larger. The stand is thinner on the west slope.

PRESCRIPTION – The priority for wildlife management is 4 – the west part and upslope is higher priority than the east part. The priority for commercial production is 2.

Upslope – Keep the area in an early stage of succession by periodically removing larger stems while leaving the less common species including the crab. To start, kill all of the honey locust, any ash or white elm which are 5 inches d.b.h. and larger and 50 to 60% of the shingle oak and shagbark hickory which are 5 inches d.b.h. and larger. Release black oak and walnut for mast and regeneration.

Down slope – In order of priority, 1. release red oak, bur oak and walnut; prune walnut and red oak crop trees less than 10 inches d.b.h. and 2. lightly release good-quality cherry and release about 4 black oak per acre for mast and regeneration. Treat the 50-foot wide zone adjacent to the agricultural field in the same manner prescribed for stands 28 and 31.

Fell and buck 1 or 2 per acre of the largest elm or ash or poor bitternut hickory for coarse woody debris.

STAND 35 – 1.6 ACRES

The stand lies on either side of a small draw and is surrounded on 3 sides by stand 34. The species are mainly white elm, red elm and walnut 9 to 14 inches with some larger white elm and cottonwood and a few cherry, black oak, green ash and red oak. The understory is coralberry, gooseberry and black raspberry.

PRESCRIPTION – The priority for commercial production is 5. Kill the cottonwood for snags and release walnut. Sever vines growing on any of the walnut and prune any walnuts which have commercial potential.

STAND 36 – 5.0 ACRES

The stand is along a drainage in an agricultural field on Keswick and Lindley loam. Shingle oak and white elm each have more than 25% of the stem count with bur oak, black cherry, white ash and honey locust each having less than 10%. There are a few boxelder. It is mostly white elm in the west and north parts of the stand with low numbers of green ash, cherry and

shingle oak. It is mostly shingle oak in the east part and south parts. There are a couple large old bur oaks in the south part. The stand ranges from mostly open to thick stem counts and contains mainly saplings and small poles. Dutch elm disease has killed lots of the white elm. The common woody shrub is smooth sumac and rose is common. There is some broomsedge and purpletop in and near the southeast edge of the stand. Some sericea lespedeza is also present.

PRESCRIPTION – Release the big old bur oak and all other bur oak. Kill the boxelder, locust and ash which are 5 inches d.b.h. and larger to eliminate the seed source and provide more snags. Burn through the stand to favor the growth of any prairie species which are present. When a burn is being completed, protect the small bur oak and the cherry by removing fuel or wetting fuel around their bases.

STAND 37 – 3.3 ACRES

The stand is along another small draw in the same agricultural field as stand 36. White elm and green ash each comprise more than 25% of the stem count. Shingle oak is 10 to 25% of the stand and black cherry is less than 10%. There is at least one black oak. The stems range from sapling size up to 10 inches d.b.h. The understory is coralberry, gooseberry, rose, and smooth sumac with some hazelnut. The regeneration is white elm and shingle oak. Dutch elm disease has killed a lot of elms. Some prairie grasses and sericea lespedeza are present.

PRESCRIPTION – Release oak and cherry from the elm and ash. Burn through the stand to favor the growth of any prairie species present in the stand.

OPEN AGRICULTURAL FIELD – 17.9 ACRES This is the field in which stands 36 and 37 are located. It is currently leased for hay production.

STAND 38 – 4.6 ACRES

Stand 38 is on west, northwest and north-facing slopes on Keswick loam 5 to 9% slope upslope and Lindley loam up to 24% slope down slope. On the south edge, it borders a grass field. Black and shingle oak each comprise 10 to 25% of the stem count with less than 10% each of red oak, shagbark hickory, bitternut hickory, white elm, red elm, black cherry, walnut, basswood and white ash with a few hackberry, boxelder, Russian mulberry and black willow. The stem size ranges from 3 to 15 inches and most are between 6 and 10 inches. There are 3 old red oak and 2 old basswood off of the steep northwest slope. The basal area varies from 80 to 120 with an average of 100 square feet. There are some nice-quality red oak, walnut and cherry poles in the stand. The understory is moderately thick and short with coralberry, gooseberry, silky dogwood, hazelnut, fragrant sumac, St. Johns-wort, black raspberry and blackberry. The silky dogwood are at the base of the slope near the Buzzard Creek bench.

PRESCRIPTION – The priority for commercial production is 4 and for wildlife, 3, because of the red oak and black oak. Favor the old basswood and red oak as den trees and lightly release them from competing species except leave any red oak or walnut competing with them. Prune and lightly release the walnut, red oak and cherry crop poles.

In the 75-foot wide zone along the field edge, complete the release during the dormant season. Release in order of priority: 1. walnut 2. black oak. The trees killed within this zone should be hinged in an attempt to develop „green brush piles". In addition to trees hinged to release walnut and black oak, hinge undesirable species 8 inches and less d.b.h. which are leaning towards the field.

STAND 39 – 2.1 ACRES

This stand includes the toe of the slope and the bench along Buzzard Creek. Bitternut hickory comprises more than 25% of the stand with 10 to 25% each of white elm, shingle oak and cottonwood and less than 10% each of black oak, hackberry, black cherry and walnut. North of the creek, most of the stems are cottonwood. Throughout the stand, most of the stems are between 5 and 15 inches d.b.h. The understory contains coralberry, gooseberry, rose and hazelnut.

PRESCRIPTION – The priority for management for commercial production is 2. Release the walnut and cherry south of the creek and the few small pole-size walnut north of the creek. Prune the crop trees.

Kill a couple of the largest cottonwood every 5 years for snags. When killing cottonwood for release or snag development, check for the presence of any broken limbs or large dead branch stubs which could eventually be excavated by woodpeckers and leave such stems alive.

In the 75-foot wide zone along the field edge, kill all of the white elm which are 5 inches d.b.h. and larger.

Fell and buck 6 of the largest elm for coarse woody debris.

STAND 40 – 6.2 ACRES

The stand lies mostly between two gullies which drain to the north into Buzzard Creek. It is mostly on Lindley loam, 14 to 24% with Keswick loam 5 to 9% upslope. The slopes are west, north and east-facing. The stand is bordered on the south by a grass field. Bitternut hickory comprises more than 25% of the stem count with less than 10% each of red oak, black oak, shingle oak, hackberry, white elm, red elm, black cherry, walnut, basswood, green ash and cottonwood with a few honey locust, white oak and Russian mulberry and old white oak. It is mostly bitternut hickory upslope with a few walnut poles mixed in down slope and some red oak on the northwest edge. There are quite a few red and white elm in the southeast portion next to the field and Dutch elm disease has killed some of them. The understory is coralberry,

gooseberry and St. Johns-wort with white elm and hackberry regeneration. The average stem size is 5 inches upslope and 10 inches down slope. The average basal area is 80 sq. feet upslope and 100 down slope.

PRESCRIPTION – Most of the commercial crop trees are down slope or east of the lane. The priority for both commercial and wildlife management is 3. In order of priority: 1. release the old white oak and other white oak, 2. release red oak including the small to medium-size sawtimber trees to increase acorn production – avoid exposing the boles to sunlight to prevent epicormic branching and 3. release good black oak and the best bitternut and shagbark. Release a total of about 25 stems per acre down slope and 35 stems upslope.

In the 75-foot wide zone adjacent to the agricultural field, complete any work during the dormant season, hinging stems as prescribed in stand 38. In addition to any release work completed in this zone, hinge all elm, hackberry and ash which are 3 to 8 inches d.b.h..

STAND 41 – 8.8 ACRES

Stand 41 extends from the end of a ridge down slope north to a tributary of Buzzard Creek and down slope east to a gully running northeast into the same tributary. The soil is mostly Lindley loam 18 to 24% with Keswick loam near the ridge. Black oak and shingle oak each comprise more than 25% of the stem count with white elm, red elm, black cherry, walnut, and hawthorn each less than 10% with a few white oak, bitternut hickory and honey locust. The stem size ranges from 3 to 15 inches with most between 5 and 9 inches. The average basal area is 90 square feet. The understory is thick and 5 to 7 feet tall and contains coralberry, gooseberry, rose and black raspberry. There is a good number of nice walnut crop trees, especially in the north part plus some good cherry.

PRESCRIPTION – The priority is 5 for commercial management and 3 for wildlife. In order of priority, 1. release and prune walnut and cherry crop trees plus the few white oak, 2. release other walnut and

3. release black oak for acorn production; prune those released black oak with good surface quality Release hawthorn from any competing elm or shingle oak. Release a total of about 30 stems per acre. Fell and buck about 5 of the largest white elm for coarse woody debris.

STAND 42 – 5.0 ACRES

Stand 42 is on a bench along a portion of Buzzard Creek. The soil type is Nodaway alluvial complex. Walnut and white elm each comprises 10 to 25% of the stem count. Bur oak, red elm, black cherry, boxelder and green ash each are less than 10% and there are a few black locusts present. Most stems are 2 to 15 inches with the majority between 7 and 12 inches. The average basal area is 110 square feet. There are two large old bur oaks and a good number of walnut poles. The understory is grasses with coralberry and black raspberry with some wild plum on the stand edge. The stems in the east portion of the stand are generally smaller than those in the west portion most stems in the east between 4 and 9 inches d.b.h..

PRESCRIPTION – The priority is 4 for commercial production and 3 for wildlife in the west part – 2 in the east part. Hinge less desirable trees on the edges of the open fields. In order of priority: 1 release the old bur oak 2 release and prune the walnut and cherry crop trees 3 release the non-crop tree walnut Retain non-competing boxelder for cavity development.

BETWEEN STANDS 42 AND 43, there is a stringer of trees along the creek consisting of boxelder, green ash and willow poles with a few bur oak, black and shingle oak. The oak could be released and any boxelder without existing or potential cavities could be hinged when dormant.

STAND 43 – 2.6 ACRES

Stand 43 is on a bench along a portion of Buzzard Creek. The soil type is Nodaway alluvial complex. It is channeled and wet. More than 25% of the stand is white elm – Dutch elm disease has killed some of the elm. Boxelder comprises 10 to 25% of the stand and bur oak, black cherry, walnut and hackberry are each less than 10%. There is at least 1 black oak, too, and 1 big cottonwood. Most stems are between 7 and 12 inches. The stand density is low with a basal area ranging from 20 to 50 square feet. The understory is grasses with coralberry and a few silky dogwoods.

PRESCRIPTION – The priority for commercial production is 4 and for wildlife, 2. Two of the walnut could be harvested now. Release the few bur oaks and the black oak. Complete a light release on the walnut poles and small saw. Hinge about a dozen elms and boxelder on the field edge.

STAND 44 – 4.8 ACRES

Stand 44 is on Nodaway alluvial soils along Buzzard Creek.

In the sandy, channeled low area near the creek in the east portion of the stand, the trees are mainly cottonwood 3 to 16 inches d.b.h. with black locust and some boxelder with a few silver maples. Some portions are saplings, some spots are semi-open, and some are poles and saplings. There are a few shingle oak saplings and a few black willows mixed in with grasses.

Upslope near and along the west field edge, the tree species are shingle oak, black cherry, white elm, hackberry and green ash. Most of the stems are between 4 and 8 inches with a basal area of 110 square feet. The understory is coralberry, gooseberry, black raspberry and blackberry.

PRESCRIPTION – The priority for wildlife is 2 and for commercial production is 1. Give a light release to the good cherry and a full release to the other cherry. Kill a couple of the largest cottonwood for snags and kill the black locust. Release shingle oak from elm and ash. Along the west edge of the stand, hinge 20 or 30 elm, ash and hackberry favoring ones which lean towards the field.

STAND 45 – 4.0 ACRES

The stand is on a southwest-facing slope and along a gully on Keswick loam, 5 to 9% and Mystic silt loam 9 to 14%. Black oak, white elm, red elm and walnut each comprise 10 to 25% of the stem count with white oak, bur oak, shagbark hickory, bitternut hickory, hackberry and black cherry each less than 10% of the stem count and with a few shingle oak and one honey locust. The stem size ranges from 4 to 16 inches with a few large old bur oak, white oak and black oak. The average diameter is 9 inches and the average basal area is 100 square feet. In the draw are good quality walnuts, cherry and black oak poles. There are also a few silver maple in the draw. In the southwest corner are cedars with sapling to small-pole hardwoods. The understory is rather thin and short with coralberry, gooseberry, rose, black raspberry and some fragrant sumac. The regeneration is hackberry, bitternut hickory, black oak and some white ash.

PRESCRIPTION – The priority for wildlife management is 3 and for commercial production, 4 to 5.

In order of priority, 1. release the old oak but leave walnut and white oak in the process, 2. release and pruned walnut and cherry crop trees and release the other white oak and 3. release bur oak and good-quality black oak Kill the white elm which are 5 inches d.b.h. and larger. In the southwest corner, release any full-crowned cedar from competing trees.

Fell and buck 6 of the largest white elm for coarse woody debris.

STAND 46 – 6.1 ACRES

The stand is on a ridge which runs from northwest to southeast. The soil type is Weller silt loam 5 to 9% slope. The stem size ranges from 4 inches to 24 inches. Black oak comprises more than 25% of the stem count. The black oak co-dominant trees are mostly between 12 and 16 inches d.b.h. while the average for all stems, including black oak, is 7 to 10 inches. The average basal area is 100 square feet. The other species comprise less than 10% and include white oak, bur oak, shingle oak, bitternut hickory, white elm, red elm, black cherry and walnut with a few red oak, honey locust and redcedar. The understory is thin and short and included coralberry, gooseberry and St. Johns-wort. The regeneration is hackberry, bitternut hickory and black oak.

PRESCRIPTION – The priority for wildlife is 3 or 4 and for commercial production is 2. In order of priority, 1. release the few old oak, 2. prune and release walnut and cherry crop trees and release the rest of the white oak and the few red oak and 3. release the bur oak, the other walnut and the few shagbark hickory. Release a total of about 25 trees per acre.

A pileated woodpecker was seen 50 feet away at the fence line at the southeast end of the stand.

STAND 47 – 3.7 ACRES

Stand 47 is on predominantly south-facing slopes on Keswick (upslope) and Mystic soils and dissected by a gully. The slope percentage ranges from 5 to 14%. The stand is saplings and poles and the cover is variable so the basal area is quite variable. Most of the stems are between dominant and codominant stems are between 5 and 9 inches. Black oak comprises more than 25% of the stem count, walnut and shingle oak are each 10 to 25% of the count, and bur oak, white elm, black cherry and redcedar are each less than 10%. There are also some silver maple and Russian mulberry. There is one old black oak and one old bur oak. Southwest of the old bur oak is a pear tree. The understory varies from moderately thick to thick and is about 4 feet tall. It contains coralberry, gooseberry, black raspberry and some rose. There is some black oak regeneration.

PRESCRIPTION – The priority for management for both wildlife and commercial production is 3 or 4.

In order of priority, 1. release the old bur and black oak, 2. prune and release the good-quality walnut poles and 3. release the pear tree, the bur oaks, the cherry crop trees and the few cedar. Kill the silver maple to eliminate the light competition and to develop snags. Fell ½ of the larger silver maple for coarse woody debris.

STAND 48 – 4.8 ACRES

Stand 48 lies on both sides of a long drainage that runs from the northwest to the southeast into Buzzard Creek. The soil type is Lindley loam, 14 to 24% slope. White oak, red oak, black oak and shagbark hickory each comprise about 25% of the stem count with less than 10% bitternut hickory and a few basswood and hackberry. The stem sizes range from sapling to large saw. Most of the hickory is pole-size. On the northeast-facing slope and in the drainage there are scattered large old white oak, red oak and black oak up to 35 inches d.b.h. The understory has coralberry, gooseberry, prickly-ash and fragrant sumac with at least one Amur honeysuckle; the regeneration is bitternut hickory.

PRESCRIPTION – There aren't many areas on the property which contain old oak. The lack of oak regeneration on such a site is a concern. The large old trees are an asset for aesthetics and can be good turkey roost trees. Because of the high percentage of each of the favored species, reducing the crown closure to allow more sunlight to reach the woodland floor to favor oak regeneration will have a very visible impact. However, the site will succeed to non-oak species unless some work is completed to encourage and favor oak regeneration. The old red oak and black oak will likely not sustain vigor for more than another 20 to 30 years. Most of the old white oak, barring any calamity, will live far longer. A harvest plus post-harvest work should be considered to favor oak regeneration. About 10 of the larger white oak along with some of the larger red oak and black oak could be harvested when markets improve. Some smaller sawtimber will also need to be included in the harvest and some post-harvest work will need to be completed in order to create large enough openings for oak regeneration. An early October burn should follow the harvest to suppress the shrubby understory and favor acorn

germination. If a harvest is marked, a balance of selected old growth oak and younger oak sawtimber needs to be retained for acorn production and site interest.

Kill any honeysuckle in the stand.

STAND 49 – 5.2 ACRES

The stand occupies the head of the drainage and a portion of the area east of stand 48. The soil types are Lindley loam down slope and Keswick loam upslope. White oak is a major component with shagbark hickory. Black oak, bitternut hickory and white ash each comprise less than 10% of the stand and there are a few black cherry. Most of the stems are between 8 and 12 inches in some portions and 10 to 14 inches in others. The range of diameters is 5 to 16 inches with some larger white oak and black oak. The average basal area is 100 square feet. In the west part, the stand is about ½ white oak and ½ shagbark hickory. In some other locations, white oak also comprises about 50% of the stem count. The understory is moderately thick with shrubs, seedlings and some saplings. The shrubs/brambles include coralberry, gooseberry, prickly-ash, black raspberry, fragrant sumac and St. Johns-wort. The regeneration is white elm, white ash, hackberry, bitternut hickory, black cherry and black oak.

PRESCRIPTION - Kill any ash 5 inches d.b.h. and larger, release cherry with good stems and crowns from competing hickory or poor-quality oak. Release about 10 scattered black oak from competing hickory.

Release older white oaks which have low branch structure and release 5 white oaks per acre with good surface quality. A few white oaks will be included in the sale if stand 49 is harvested.

STAND 50 – 5.8 ACRES

Stand 50 is on a southwest-facing slope above stand 48. The soil types are Lindley loam down slope and Keswick loam upslope. The slopes are 9 to 24%. White oak, red oak, black oak and shagbark hickory each comprise 10 to 25% of the stem count with bitternut hickory, hackberry, white elm and basswood less than 10% each. Most stems are between 9 and 17 inches; the basal area averages 90 square feet. Many of the white oak saplings and poles are intermediate or suppressed. There are some scattered large white oak, red oak and black oak sawtimber trees and medium pole-size to medium sawtimber-size shagbark hickory and black oak. There is a 51-inch diameter red oak in the stand. At the south end are bitternut hickory poles with hackberry, some basswood and white elm and a few shingle oak, a small walnut pole and a good cherry pole along with a few other cherry. The understory is thin and short containing coralberry, gooseberry and some St. Johns-wort and rose.

PRESCRIPTION – The priority for management for wildlife purposes is 2 or 3 and for commercial production, 1 or 2. Release the old oaks and the other white oaks. Release the walnut and cherry. Kill any white elm 5 inches d.b.h. and larger. Hinge some stems along the edge – do not cut oak, walnut or cherry.

Fell and buck about 10 of the largest elm or poor hackberry or bitternut hickory for coarse woody debris.

STAND 51 – 3.4 ACRES

The stand is on mostly south and east-facing 5 to 14% slopes on Keswick loam upslope and Mystic silt loam down slope. It is dissected by a small gully. Bitternut hickory, hackberry, white elm and red elm each comprise 10 to 25% of the stem count with less than 10% each of red oak, black oak, shingle oak, black cherry and walnut. There is also at least one white oak. In spots, the trees are mostly bitternut hickory. The range in diameters is 3 to 24 inches with most of the stems down slope between 6 and 12 inches and smaller stems on average upslope. There are a few large shingle oak sawtimber trees and a bur oak saw. Dutch elm disease has killed some of the elm. The understory is moderately thick, 4 feet tall and contains coralberry, gooseberry, hazelnut and black raspberry with some rose and with white elm, hackberry and bitternut hickory regeneration.

PRESCRIPTION – The priority for management for both wildlife and commercial production is 3. In order of priority: 1. cut all tree stems around the old bur out to 50 feet from the crown leaving any red or white oak in that zone alive and standing, 2. release the white oak and the red oak sawtimber and the walnut and 3. release full-crowned black and black oak poles with good surfaces. Release a total of no more than 30 stems per acre.

In the 75-foot wide zone adjacent to the bottomland field at the south end of the stand, hinge white elm and hackberry stems during the dormant season.

STAND 52 – 2.0 ACRES

Stand 52 is on a southeast-facing 9 to 14% slope on Mystic silt loam soils. It is a young mixed stand with quite variable density. Stems range from 3 to 16 inches; most are between 4 and 8 inches. Shingle oak and bitternut hickory each comprise close to 25% of the stand. Shagbark hickory is the other major component with hackberry, white elm and red elm each comprising less than 10%. There are also several walnut, two white oak, and a few bur oak, black cherry and boxelder. The walnut range in size from large saplings to small poles and vary from poor to good quality. The understory varies from thin to thick and 2 to 3 feet tall. It contains coralberry, gooseberry, black raspberry and some hazelnut.

PRESCRIPTION - The priority for management for both wildlife and commercial is 2. Release the white and bur oak and do a light release on walnut crop trees, i.e. kill just the trees overtopping them 2 release the non-commercial walnut

During the dormant season, hinge hackberry, white elm and poor bitternut hickory stems 5 inches d.b.h. and larger which are within 30 feet of the north edge of the stand.

STAND 53 – 15.0 ACRES

The stand lies along Buzzard Creek and one minor drainage and one major drainage emptying into it. The majority of the stand is on Nodaway alluvial soils with about 20 % of the upper portions of the two drainages on Olmitz-Vesser-Colo complex. More than 25% of the stem count is boxelder with 10 to 25% cottonwood and less than 10% each black oak, shingle oak, hackberry, black cherry, walnut, black locust, silver maple, black willow, green ash and sandbar willow. As you proceed from the south to the north in the stand, there are more maple and cherry, some cottonwood saw and a few honey locust but only a few walnut. The density of the stand is quite variable. The stems are saplings and poles with a few larger stems. The average codominant and dominant trees measure 6 to 10 inches. The understory is moderately thick and 2 to 3 feet tall with coralberry and gooseberry.

PRESCRIPTION - The priority for management for both wildlife and commercial production is 2 to 3. To increase edge effect, during the dormant season, hinge trees which are growing on or near the edge of the stand; these will be mostly boxelder. Kill 1 or 2 big cottonwood for snags. Lightly release and prune walnut and cherry crop trees and just release the other walnut and cherry. Release all black oak for mast.

STAND 54 – 1.8 ACRES

The stand is on east and south-east facing 9 to 18% slopes on Mystic silt loam. It is mostly black and shingle oak with less than 10% each shagbark hickory, bitternut hickory, hackberry, black cherry and green ash along with a few redcedar, Russian mulberry and large cottonwood. On and near the field edge on the west, the stems are mostly saplings and small poles with poles to small sawtimber in the small draw with dissects the stand and also on the lower portion of the slope. The understory is coralberry, gooseberry, blackberry, St. Johns-wort and a few hazelnuts.

PRESCRIPTION – This is a low-priority stand for commercial production and a 2 for wildlife management. Release the large black oak sawtimber trees at the west end for mast and regeneration. Release the one old bur oak. During the dormant season, hinge any ash, elm, hackberry or bitternut hickory stems within 30 feet of the west edge of the stand. Kill white elm and green ash trees over 5 inches d.b.h. through the rest of the stand.

STAND 55 – 10.0 ACRES

Stand 55 is on north and east-facing 5 to 24% slopes on Keswick loam upslope and Lindley loam down slope; the stand is dissected by several gullies. Shingle oak is the major species with black oak 10 to 25%. White elm, red elm, black cherry, shagbark hickory, bitternut hickory, walnut and white ash each comprise less than 10% of the stem count with some Russian mulberry and a few hawthorn and white oak. There are a few large white oaks near the west end of the stand. At the east end of the stand are 4 large shingle oaks and black oak.

The majority of the rest of the stand is sapling and small pole-size stems with some large pole to small sawtimber. The understory is thick with seedlings, saplings and shrubs including coralberry, gooseberry, blackberry, hazelnut, St. Johns-wort, wild plum and smooth sumac, white elm, bitternut hickory, shingle oak, white ash, black cherry and black oak.

PRESCRIPTION – The priority for management for wildlife is 2 and for commercial products is 1. Every 30 or 40 feet along the field edge, release a black oak for mast production – hinge 3 to 6-inch diameter trees as is feasible during this release. Release any white oak at the west end and anywhere else they occur in the stand. Release and prune as needed the several good-quality walnut poles above the small pond and release black oak poles in the same location.

STAND 56 – 9.8 ACRES

Most, if not all, of the north portion of this stand will be inundated when a planned watershed structure is completed. Stand 56 lies mostly on Olmitz-Vesser-Colo soils with a portion of the west part being upslope on Lindley loam. Shingle oak comprises more than 25% of the stand with black oak, white elm and red elm each 10 to 25%. Bur oak, cherry, walnut and green ash each comprise less than 10% of the stem count with a few red oak and cottonwood. The range of diameters is 4 to 44 inches d.b.h.. Most of the stems are between 7 and 11 inches except in the middle portion of the stand where shingle oak with black oak are mostly between 8 and 17 inches. There are some large cottonwoods along the creek. The understory of coralberry and gooseberry and rose varies from moderately thick to thick with the average shrub height being about 3 to 4 feet. Dutch elm disease has killed some elm and oak wilt has killed some black oak and shingle oak.

PRESCRIPTION – Currently, the stand is a priority 2 for wildlife management and 1 for commercial production. There are about a dozen walnuts which warrant crown release. Also, release the bur oak, red oak and good-quality cherry. Kill about 20 of the largest white elm for snags. Because of the planned structure, this stand should be reassessed after the structure is completed.

STAND 57 – 14.0 ACRES

Stand 57 occupies a ridge plus west and northeast-facing side slopes. The soils on the ridge are Keswick loam 5 to 9% with some Weller silt loam, 2 to 5% slope. The side slopes are Lindley loam, 14 to 24% slope. White oak, black oak and shagbark hickory each comprise 10 to 25% of the stem count with red oak, bitternut hickory, white elm, red elm, black cherry, basswood and white ash each being less than 10% of the count. Most of the stems are between 4 and 10 inches d.b.h. with larger scattered oak which are mostly white oak. The understory is thin and short with coralberry, gooseberry, black raspberry, gray dogwood, fragrant sumac and some St. Johns-wort and rose. There are also ironwoods in the stand. The regeneration is white ash, bitternut hickory and white oak.

PRESCRIPTION – The stand has a priority of 3 or 4 for wildlife. At the north end of the ridge and also down slope to the north, there are few white oaks and some basswood. To promote white oak regeneration, clearcut down to 1-inch diameter stems all but the white oak. Make the opening about 200 feet long and about 100 feet wide. Frill stems 9 inches and larger and leave for snags and fell the rest. Treat all stumps which are not oak.

Throughout the rest of the stand, kill ash and white elm which are 5 inches d.b.h. and larger and kill any ironwood 2 inches d.b.h. and larger. Also, release in order of priority: 1. any red oak and any large white oak or bur oak 2. any other white oak 3. cherry for mast and regeneration 4. black oak. Release a maximum of 30 stems per acre while counting a large oak as the equivalent of 3 stems.

STAND 58 – 11.2 ACRES

Stand 58 is a very early succession stand on Keswick loam, 5 to 14% upslope and Mystic soils, 9 to 14% slope. There is some dissimilarity between different portions of the stand but not enough to warrant calling each a stand by itself. I've broken the stand into 4 sub-stands; three are separated from each other by small open areas which are also described.

58-1 is a small area at the southeast end of the stand. It is mostly shingle oak, black oak, bur oak, hackberry and white elm. Diameters range from 3 to 11 inches. The basal area is 110 square feet. Shingle oak saplings dominate the edges of the stand. The understory is thick and tall with coralberry, gooseberry, black raspberry and St. Johns-wort. Dutch elm disease has killed some of the elm.

Prescription – Release the bur oak for mast and regeneration. Controlled burn can be used through the stand.

The open area between 58-1 and 58-2 is grass with shingle oak and cedar saplings and some small poles and some black oak and white elm. The site also contains St. Johns-wort and black raspberry. There are some prairie species present but most of the grass is fescue. There is a volunteer pear tree in a little group of trees in this open area.

58-2 has a variable basal area with the stem diameters between 4 and 12 inches. It is mostly shingle oak with some red elm, shagbark hickory and boxelder, a couple walnut and cherry, a large cottonwood and a big double bur oak. The understory is moderately thick and 2 to 3 feet tall.

Prescription – The priority for wildlife management is 3 and for 0 for commercial production. Release the walnut and cherry for mast and regeneration. Kill the elm and release the shagbark hickory along the edges of the stand. Also release the bur oak. For small cavity development, favor boxelder over the shingle oak. During the dormant season, hinge about 40 less desirable trees along the edge of the stand.

The open area between 58-2 and 58-3 is grass (mostly fescue) with increasing numbers of St. Johns-wort (thick) with gray dogwood, shingle oak and cedar saplings down slope.

58-3 is similar to 58-2 with most stems between 4 and 8 inches with a few larger. There are a couple of white oak and more cherry and bur oak with some hazelnut. The edge of the stand is thick with shingle oak saplings, gray dogwood, St. Johns-wort and blackberry.

Prescription 58-3 – Release in order of priority: 1 white oak, walnut and good-quality cherry 2 bur oak

Prairie – On the north edge of 58-3 between 58-3 and the lane along the woods edge is a small opening with prairie species.

58-4 is mostly a thick, dog-hair-thick stand of saplings. Most of the saplings are shingle oak with some black oak and black cherry with pole-size shingle oak and some pole-size black oak, shagbark hickory and black cherry. The area is thick with St. Johns-wort and some wild plum, hazelnut, gray dogwood, blackberry, black raspberry and some hawthorn.

Prescription – Brush cut during the growing season (to reduce sprouting vigor) as much of the site as possible except avoid cutting black oak, cherry and shagbark hickory plus the areas of plum, hazelnut and blackberry. Burn through the site when fuel quantity and condition favors. Leave any black oak, black cherry and shagbark hickory alive for mast and try to avoid fire damage to those stems and the areas of plum, hazelnut and blackberry.

STAND 59 – 7.0 ACRES

Stand 59 is on the north ½ of a southeast to northwest ridge and on the north-facing slope below. The soil type upslope is Keswick loam, 5 to 9% slope and down slope it is Lindley loam, 24 to 40% slope. Black oak comprises more than 25% of the stem count with white oak, red oak and shagbark hickory each comprising 10 to 25% of the count. Bur oak, bitternut hickory, white ash, basswood and white elm are each less than 10% with a few walnut. The basal area varies from 70 to 120 square feet with an average of 90 square feet. Stem size ranges from 7 to 24 inches with most stems between 11 and 16 inches d.b.h.. The stand has a good stocking of red oak and white oak growing stock in the 12 to 16-inch diameter range. There is some bitternut hickory mortality within the stand. By the lane along the south edge is some old oak wilt mortality. The understory ranges from thin to thick and from 3 to 7 feet tall. It contains coralberry, gooseberry, prickly-ash, black raspberry, blackberry and fragrant sumac with white ash, hackberry and bitternut hickory regeneration.

PRESCRIPTION – The priority for wildlife management is 3.

Harvest – About 15 red oaks, 10 white oaks and 1 walnut could be harvested when markets improve along with some basswood, hickory, ash and black oak. Some pre-harvest work needs to be completed followed by an early-April burn. Then IF there is a good acorn crop in the fall and the markets are once again favorable, a sale could be let.

After the harvest, some post-harvest work will also be needed. Kill the white ash, white elm and poor-quality hickory and basswood which are 5 inches d.b.h. and larger. Kill the poor-quality black oak as well which are in the 5 to 12-inch diameter range.

STAND 60 – 2.1 ACRES

The stand is mostly on Olmitz-Vesser-Colo soils with a small portion of Lindley upslope at the southwest end. Bitternut hickory comprises more than 25% of the stand, walnut is 10-25% of the stand, and black oak, shingle oak, white elm and black cherry each comprise less than 10% of the stand. There are a few green ash poles and cottonwood sawtimber along the drainage at the west end. The stem diameters are mostly between 6 and 9 inches. The basal area ranges from 40 to 120 sq. feet with an average of 90 sq. feet. The understory is thin and short with coralberry, gooseberry, black raspberry and a few hazelnuts.

PRESCRIPTION – The priority for commercial production is 5 and for wildlife, 2. Prune and lightly release the walnut and cherry crop trees. Kill 2 or 3 cottonwood for large snags. Complete a light release of the best bitternut hickory poles.

STAND 61 – 3.8 ACRES

The stand is on Keswick loam, 5 to 9% upslope with Mystic silt loam 9 to 14% down slope. White oak, black oak, shagbark hickory and bitternut hickory each comprise 10 to 25% of the stem count with less than 10% each bur oak and red oak and a few black cherry, elm and ash. The basal area ranges from 80 to 120 square feet with an average of 100 square feet. The stems range from 5 to 22 inches with a few larger stems. Most stems are between 10 and 17 inches. The understory contains coralberry, gooseberry, fragrant sumac and lots of tall prickly-ash with white ash, hackberry and bitternut hickory regeneration. There is a grand old 47-inch diameter white oak with abnormal girth from an old fork up to 5 feet.

PRESCRIPTION – It's about 10 years till the stand will be ready for a harvest. Kill elm and ash trees over 5 inches. Release the large old white oak. Complete a late-March or early-April burn to knock back the prickly-ash and the smaller white ash, hackberry and bitternut hickory regeneration. In the 2 years prior to a planned harvest, complete a late-March or early-April burn again. After the harvest (completed one year after a good white oak acorn crop), thin out the hickory by about 75% and eliminate any elm and ash larger than 2 inches d.b.h. as well as any poor-quality black oak.

STAND 62 – 16.2 ACRES

The stand occupies north, west and southwest-facing slopes and the narrow ridge at the top of the slope. The narrow, sloping ridge is on Weller silt loam, 5 to 9% slope with Keswick loam, 5 to 9% down slope of the Weller and some Lindley loam and Mystic silt loam below the Keswick loam. White oak and shagbark hickory each comprise more than 25% of the stem count with bur oak, black oak and bitternut hickory each comprising 10% or less. There are also a few red oak, hackberry, black cherry and walnut. The stems range from 5 to 18 inches d.b.h. with a few larger stems; most are between 6 and 12 inches. Any mature sawtimber trees are widely scattered. The basal area averages 90 square feet. The shagbark average smaller than the oak and the shagbark predominate through most of the stand. The understory is moderately thick, 2 to 3 feet tall, and contains coralberry, gooseberry, blackberry and some

fragrant sumac, rose, St. Johns-wort and black raspberry. The regeneration is white ash, red elm and some white oak and black oak.

PRESCRIPTION – The priority for management for wildlife is 2 to 3 and just 1 for commercial production. The scattered mature sawtimber trees could EITHER be harvested OR left for mast/roost/aesthetics/regeneration. Kill any ash 5 inches d.b.h. and larger except for ash with existing or potential cavities. In order of priority, 1. release walnut, cherry and the few red oak for mast and regeneration, 2. release bur for mast and regeneration, 3. release the larger white oak and black oak for mast and regeneration and 4. release other white oak plus black oak. Where shagbark hickory crowd a poor quality or nonmerchantable white oak, release the white oak by about 50 feet on four sides; for a good-quality white oak 12 inches d.b.h. and less, do a crown-touch release on 2 or 3 sides only.

Fell and buck about 20 of the larger white elms for coarse woody debris.

STAND 63 – 2.8 ACRES

Stand 62 is along a small drainage on Olmitz loam, 2 to 5% slope with some steeper Lindley soils on the edges of the stand. Pole-size red oak, bitternut hickory and basswood are the dominant size/species with white oak, shagbark hickory hackberry, white elm and red elm each comprising 10% or less of the stem count. Along the drainage are white and red oak sawtimber trees. There is one poor silver maple sawtimber-size tree. There is also a super nice 9-inch cherry near the east fence. The basal area ranges from 60 to 110 with an average of 85. Most of the stems are between 8 and 14 inches. The understory is moderately thick and 4 feet tall. It contains coralberry, gooseberry, black raspberry and some rose with white ash regeneration.

PRESCRIPTION – The priority for management for both wildlife and commercial production is 3. Harvest – 2 or 3 each of red oak and white oak plus 1 walnut could be harvested.

Release the nice cherry pole on 3 sides – the other side is against a large old white oak. Release the other cherry, red oak and walnut poles plus any old oak which are not harvested. There is a sawtimber-size swamp white oak about 120 feet from the road plus a pole and another 12-inch stem north of the larger tree; release all three trees.

TUBAUGH SUMMARY OF STANDS

STAND	ACRES	OVERSTORY	TREE SIZE CLASS	PRESCRIPTION	MANAGEMENT SYSTEM	PRIORITY	DATE COMPLETED
1	3.6	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
2	4.5	black locust	pole timber	stand conversion	Even Age	LOW	
3	25.7	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
4	4.1	oak-hickory	sapling		Early Successional	LOW	
5	4.9	elm-ash-cottonwood-willow	pole timber	crop tree release	Even Age	LOW	
6	1.9	oak-hickory	sapling	crop tree release	Even Age	LOW	
7	4.4	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
8	6.1	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
9	4.6	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
10	26.4	red cedar-mixed hardwoods	pole timber	weed tree removal	Early Successional	HIGH	
11	5.9	oak-hickory	small sawtimber	crop tree release	Even Age	LOW	
12	3.3	oak-hickory	pole timber		Early Successional	MEDIUM	
13	13.4	oak-hickory-walnut	pole timber	crop tree release	Even Age	HIGH	
14	5.6	oak-hickory-walnut	pole timber	crop tree release	Even Age	MEDIUM	
15	13.9	mixed oak	pole timber	weed tree removal	Early Successional	HIGH	
16	8.0	red cedar-mixed hardwoods	pole timber	crop tree release	Even Age	HIGH	
17	3.5	mixed oak	pole timber	crop tree release	Even Age	HIGH	
18	3.5	oak-hickory	pole timber	crop tree	Even Age	HIGH	

				release			
19	3.3	oak-hickory	pole timber	crop tree release	Even Age	LOW	
20	3.9	oak-hickory	pole timber	crop tree release	Even Age	HIGH	
21	1.1	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
22	12.1	oak-hickory	pole timber	crop tree release	Even Age	LOW	
23	15.4	oak-hickory	sapling	weed tree removal	Early Successional	HIGH	
24	2.5	oak-hickory	pole timber	crop tree release	Even Age	HIGH	
25	5.0	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
26	3.4	oak-hickory	pole timber	weed tree removal	Even Age	MEDIUM	
27	5.3	mixed oak	pole timber	weed tree removal	Early Successional	HIGH	
28	29.7	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
29	8.5	oak-hickory	pole timber	crop tree release	Even Age	LOW	
30	3.3	black walnut	small sawtimber	crop tree release	Even Age	HIGH	
31	6.0	oak-hickory	pole timber	crop tree release	Even Age	LOW	
32	1.1	oak-hickory-walnut	pole timber	crop tree release	Even Age	LOW	
33	2.8	oak-hickory-walnut	pole timber	crop tree release	Even Age	HIGH	
34	7.7	oak-hickory-walnut	sapling	weed tree removal	Early Successional	HIGH	
35	1.6	black walnut	pole timber	crop tree release	Even Age	HIGH	
36	4.7	elm-ash-locust	sapling	prescribed fire	Early Successional	LOW	
37	3.2	elm-ash-locust	sapling	prescribed fire	Early Successional	LOW	
38	4.6	oak-hickory	pole timber	crop tree release	Even Age	HIGH	
39	2.1	oak-hickory	small sawtimber	crop tree release	Even Age		
40	6.2	oak-hickory	pole timber	crop tree	Even Age	MEDIUM	

				release			
41	8.8	oak-hickory-walnut	pole timber	crop tree release	Even Age	HIGH	
42	5.0	oak-hickory-walnut	pole timber	crop tree release	Even Age	HIGH	
43	2.6	boxelder-elm	pole timber	crop tree release	Even Age	HIGH	
44	4.8	elm-ash-cottonwood-willow	sapling	crop tree release	Even Age	LOW	
45	4.0	oak-hickory-walnut	pole timber	crop tree release	Even Age	HIGH	
46	6.1	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
47	3.7	mixed oak	pole timber	crop tree release	Even Age	HIGH	
48	4.8	oak-hickory	sawtimber	harvest	Even Age	HIGH	
49	5.2	oak-hickory	pole timber	crop tree release	Even Age	HIGH	
50	5.8	oak-hickory	small sawtimber	crop tree release	Even Age	LOW	
51	3.4	oak-hickory-hackberry	pole timber	crop tree release	Even Age	MEDIUM	
52	2.0	oak-hickory-hackberry	pole timber	crop tree release	Even Age	LOW	
53	15.0	elm-ash-cottonwood-willow	pole timber	crop tree release	Even Age	MEDIUM	
54	1.8	oak-hickory-walnut	sapling	prescribed fire	Early Successional	LOW	
55	10.0	oak-hickory	pole timber	crop tree release	Even Age	LOW	
56	9.8	oak-hickory	pole timber	crop tree release	Even Age	LOW	
57	14.0	oak-hickory	pole timber	crop tree release	Even Age	MEDIUM	
58	11.2	oak-hickory	pole timber	crop tree release	Early Successional	LOW	
59	7.0	oak-hickory	small sawtimber	weed tree removal	Even Age	MEDIUM	
60	2.1	oak-hickory	pole timber	crop tree release	Even Age	HIGH	
61	3.8	oak-hickory	small sawtimber	weed tree removal	Even Age	MEDIUM	

62	16.2	oak-hickory	pole timber	crop tree release	Even Age	LOW	
63	2.8	oak-hickory-hackberry	pole timber	harvest	Even Age	MEDIUM	

TUBAUGH HIGHEST PRIORITY PROJECTS

Timber Stand Improvement

Stand #	Acres	Prescription
16	8.0	crop tree release
17	3.5	crop tree release
18	3.5	crop tree release
20	3.9	crop tree release
24	2.5	crop tree release
33	2.8	crop tree release
35	1.6	crop tree release
38	4.6	crop tree release
41	8.8	crop tree release
42	5.0	crop tree release
45	4.0	crop tree release
47	3.7	crop tree release
49	5.2	crop tree release
60	2.1	crop tree release
	78.5	

Early Successional Improvement

Stand #	Acres	Prescription
10	26.4	edge feathering/weed tree removal
15	13.9	edge feathering/weed tree removal
23	15.4	edge feathering/weed tree removal
27	5.2	edge feathering/weed tree removal
34	7.7	edge feathering/weed tree removal
	68.6	

Shelterwood Harvest

Stand #	Acres	Prescription
13	13.4	shelterwood and weed tree removal
30	3.3	shelterwood and weed tree removal
43	2.6	shelterwood and weed tree removal
48	4.8	shelterwood and weed tree removal
	24.1	

TUBAUGH HISTORICAL MAPS

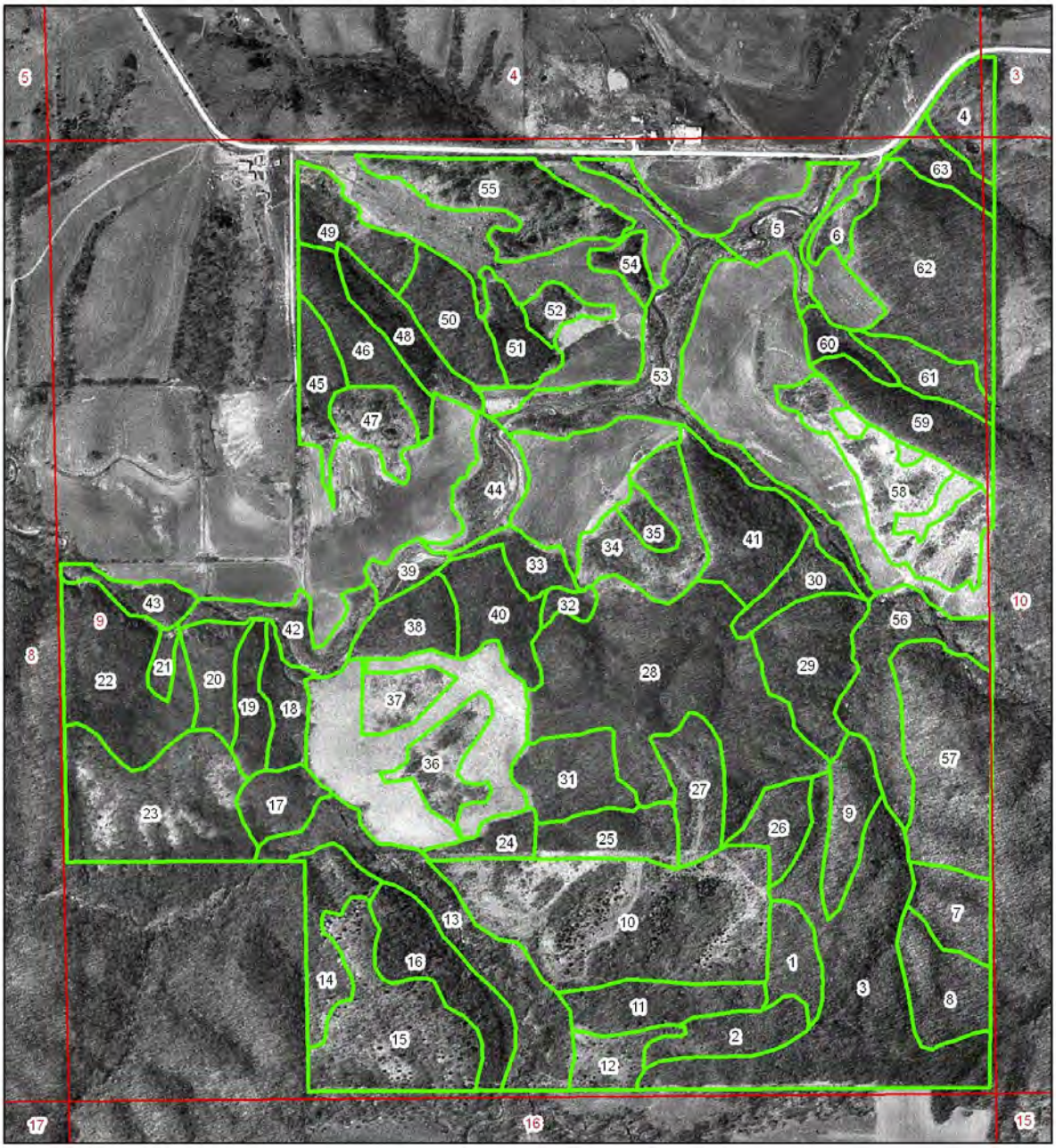
Iowa DNR Rathbun Wildlife Unit-Tubaugh Tract
Location: Union 4, 9 T70N R16W in Appanoose County, Iowa
Image: 2002 **Map prepared: 5/19/2011 by Jeremy Cochran**

Legend
section lines
forest stands

N

1 inch = 742 feet

Iowa DNR Rathbun Wildlife Unit-Tubaugh Tract
Location: Union 4, 9 T70N R16W in Appanoose County, Iowa
Image: 1990s **Map prepared: 5/19/2011 by Jeremy Cochran**

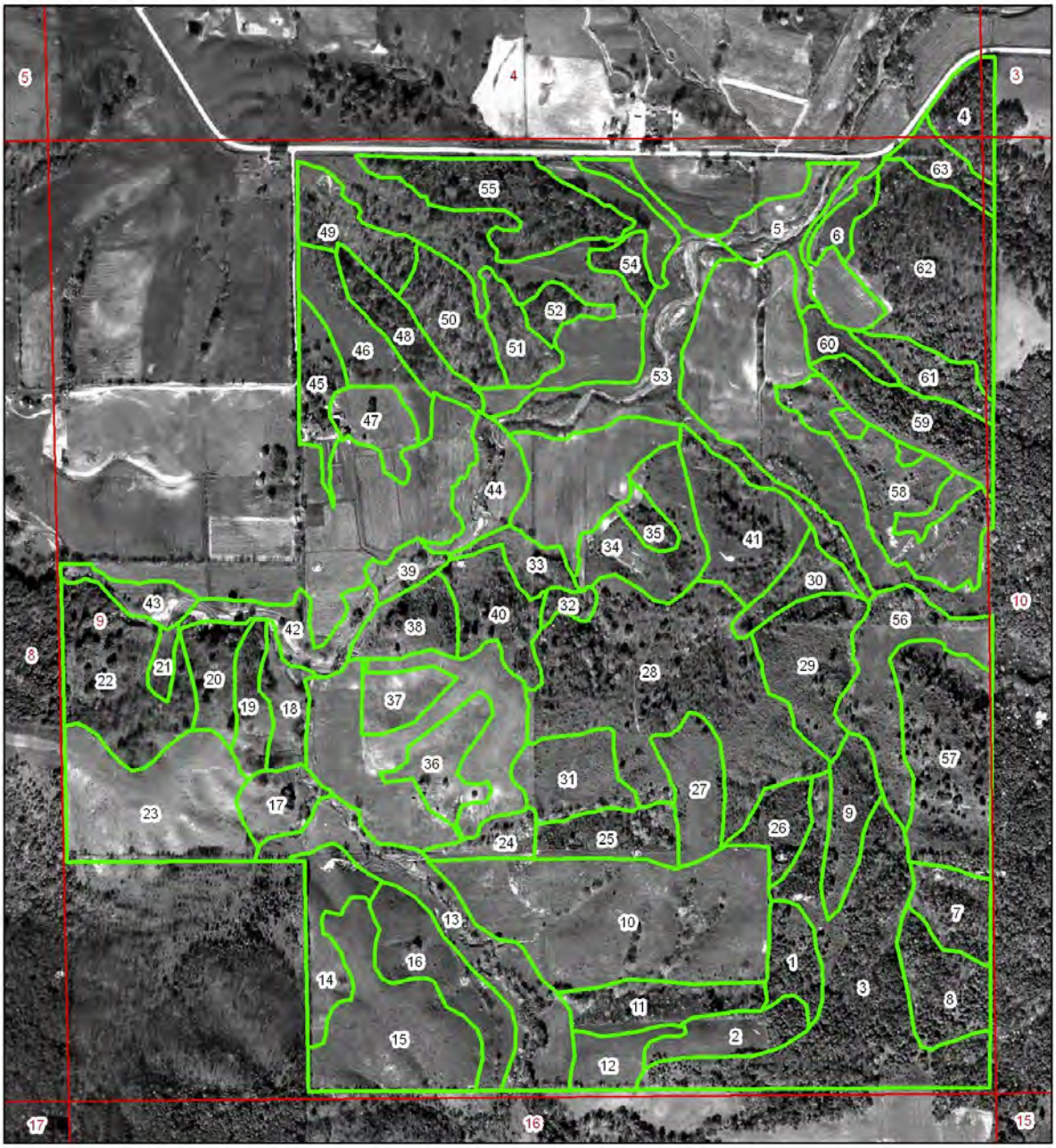


Legend
section lines
forest stands

N

1 inch = 742 feet

Iowa DNR Rathbun Wildlife Unit-Tubaugh Tract
Location: Union 4, 9 T70N R16W in Appanoose County, Iowa
Image: 1960s **Map prepared: 5/19/2011 by Jeremy Cochran**

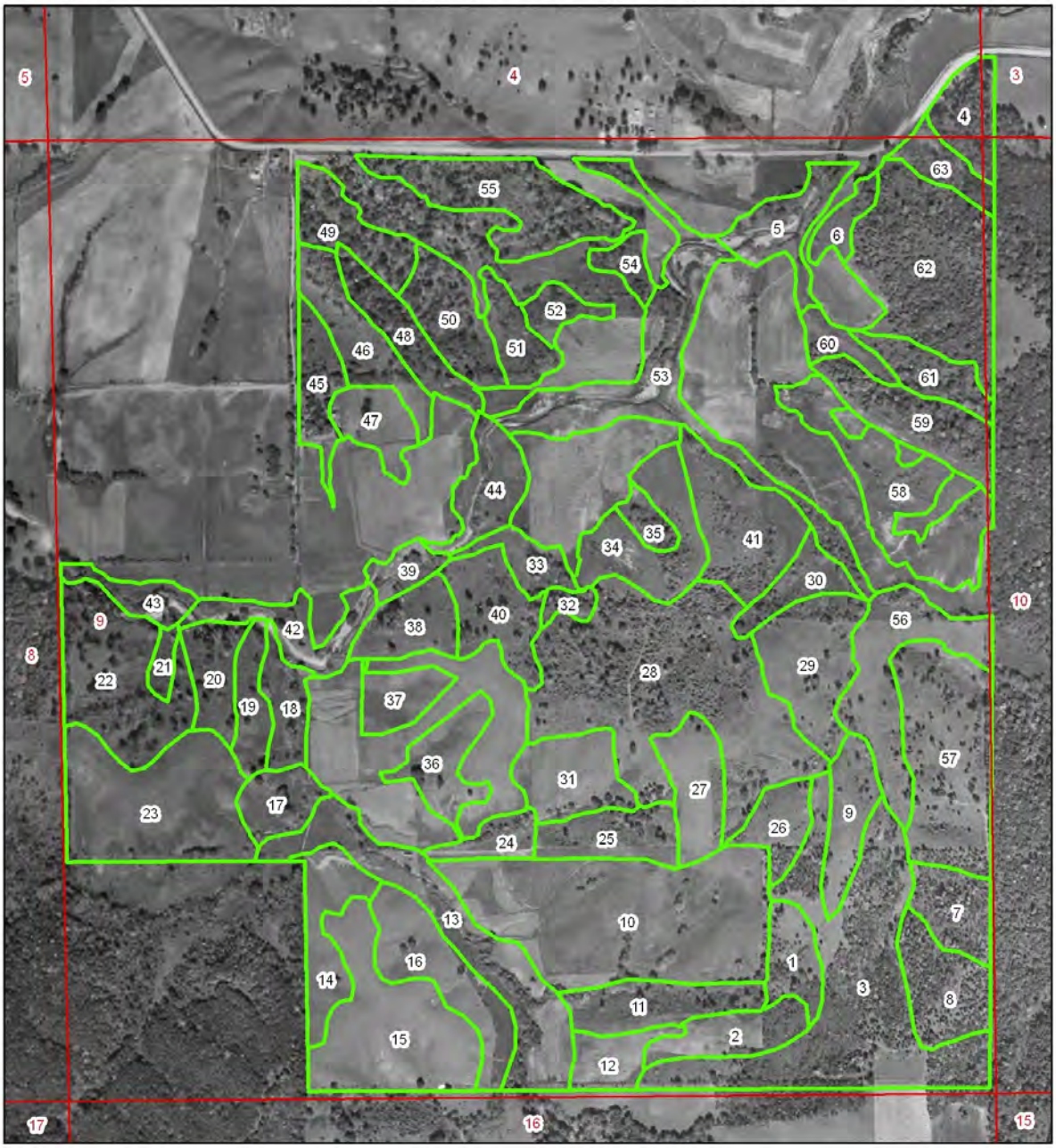


Legend
section lines
forest stands

N

1 inch = 742 feet

Iowa DNR Rathbun Wildlife Unit-Tubaugh Tract
Location: Union 4, 9 T70N R16W in Appanoose County, Iowa
Image: 1950s **Map prepared: 5/19/2011 by Jeremy Cochran**

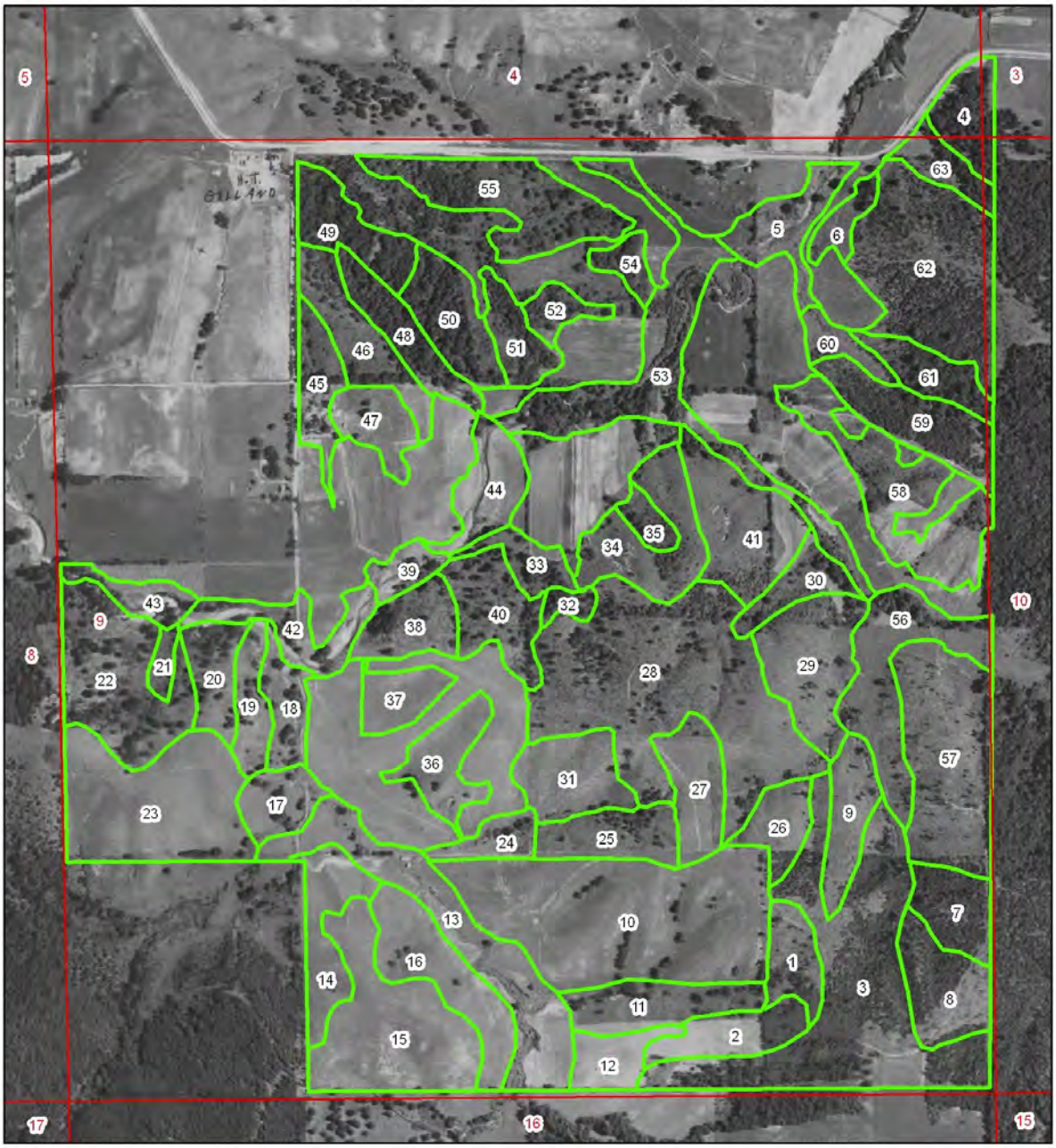


Legend
section lines
forest stands

N

1 inch = 742 feet

Iowa DNR Rathbun Wildlife Unit-Tubaugh Tract
Location: Union 4, 9 T70N R16W in Appanoose County, Iowa
Image: 1938 **Map prepared: 5/19/2011 by Jeremy Cochran**

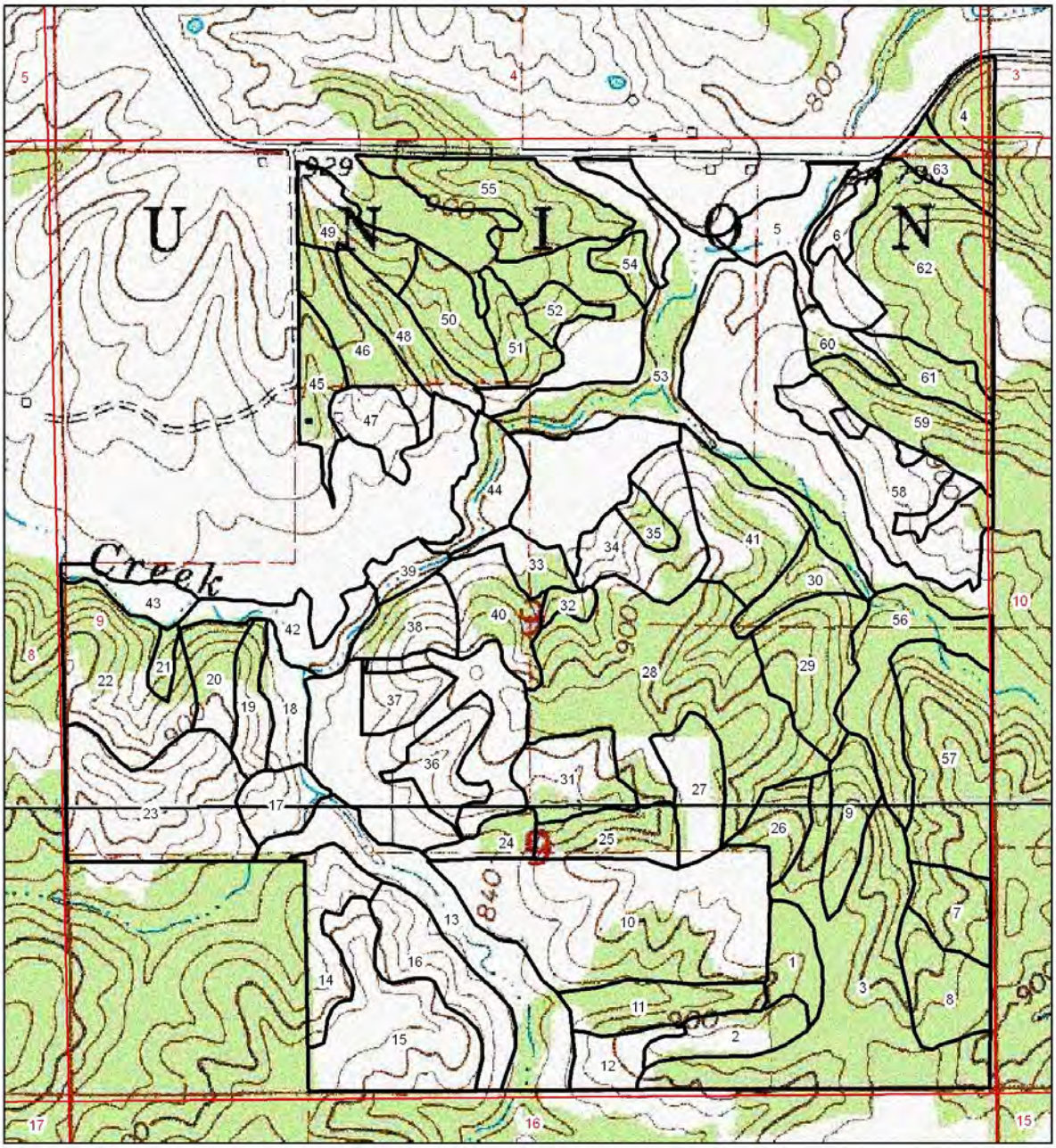


Legend
section lines
forest stands

N

1 inch = 742 feet

Iowa DNR Rathbun Wildlife Unit-Tubaugh Tract
Location: Union 4, 9 T70N R16W in Appanoose County, Iowa
Image: USGS Topography **Map prepared: 5/19/2011 by Jeremy Cochran**



Legend
section lines
forest stands

N

1 inch = 742 feet

APPENDIX

Table 1. Forest Breeding Birds of Greatest Conservation Need in SC Iowa

Common Name	Scientific Name
Bald eagle	*Haliaeetus leucocephalus*
Red-shouldered hawk	*Buteo lineatus*
Broad-winged hawk	*Buteo platypterus*
Ruffed grouse	*Bonasa umbellus*
American woodcock	*Scolopax minor*
Black-billed cuckoo	*Coccyzus erythropthalmus*
Yellow-billed cuckoo	*Coccyzus americanus*
Long-eared owl	*Asio otus*
Whip-poor-will	*Caprimulgus vociferus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Acadian flycatcher	*Empidonax virescens*
Willow flycatcher	*Empidonax traillii*
Least flycatcher	*Empidonax minimus*
White-eyed Vireo	*Vireo griseus*
Brown creeper	*Certhia americana*
Veery	*Catharus fuscescens*
Wood thrush	*Hylocichla mustelina*
Blue-winged warbler	*Vermivora pinus*
Cerulean warbler	*Dendroica cerulea*
Black-and-white warbler	*Mniotilta varia*
Prothonotary warbler	*Protonotaria citrea*

Worm-eating warbler	*Helmitheros vermivorus*
Louisiana waterthrush	*Seiurus motacilla*
Kentucky warbler	*Oporornis formosus*
Hooded warbler	*Wilsonia citrina*
Yellow-breasted Chat	*Icteria virens*
Eastern towhee	*Pipilo erythrophthalmus*

Table 2. Forest Migratory Birds of Greatest Conservation Need in SC Iowa

Common Name	**Scientific Name**
Golden-winged warbler	*Vermivora chrysoptera*
Canada warbler	*Wilsonia canadensis*
Rusty Blackbird	*Euphagus carolinus*

Table 3. Forest Mammals of Greatest Conservation Need in SC Iowa

Common Name	**Scientific Name**
Northern myotis	*Myotis septentrionalis*
Evening bat	*Nycticeius humeralis*
Indiana bat	*Myotis sodalis*
Woodland vole	*Microtus pinetorum*
Spotted skunk	*Spilogale putorius*
Southern Flying Squirrel	*Glaucomys volans*

Table 4. Forest Reptiles and Amphibians of Greatest Conservation Need in SC Iowa

Common Name	**Scientific Name**
Smallmouth salamander	*Ambystoma texanum*
Cricket Frog	*Acris crepitans*

Ornate box turtle	*Terrapene ornata*
Slender glass Lizard	*Ophisaurus attenuatus*
Six-lined racerunner	*Cnemidophorus sexlineatus*
Northern Prairie Skink	*Eumeces septentrionalis*
Smooth earth snake	*Virginia valeriae*
Western worm snake	*Carphophis amoenus*
Smooth green snake	*Opheodrys vernalis*
Prairie kingsnake	*Lampropeltis calligaster*
Speckled kingsnake	*Lampropeltis getulus*
Bullsnake	*Pituophis catenifer sayi*
Timber Rattlesnake	*Crotalus horridus*

Table 5. Forest Butterflies of Greatest Conservation Need in SC Iowa

Common Name	**Scientific Name**
Pipevine swallowtail	*Battus philenor*
Wild indigo duskywing	*Erynnis baptisiae*
Sleepy Duskywing	*Erynnis brizo*
Zebra swallowtail	*Eurytides marcellus*
Silvery Blue	*Glaucopsyche lygdamus*
Zebulon skipper	*Poanes zabulon*
Hickory Hairstreak	*Satyrium caryaevorum*
Edward"s Hairstreak	*Satyrium edwardsii*
Striped Hairstreak	*Satyrium liparops*

GUIDELINES FOR PROTECTION OF INDIANA BAT SUMMER HABITAT

(Revised June 2007)

These guidelines were prepared to provide information about the Indiana bat and its summer habitat requirements in Iowa and to prevent inadvertent harm to the species through various human activities. This update of the guidelines is in response to changes in the US Fish and Wildlife Service requirements for protecting this endangered species. The changes include:

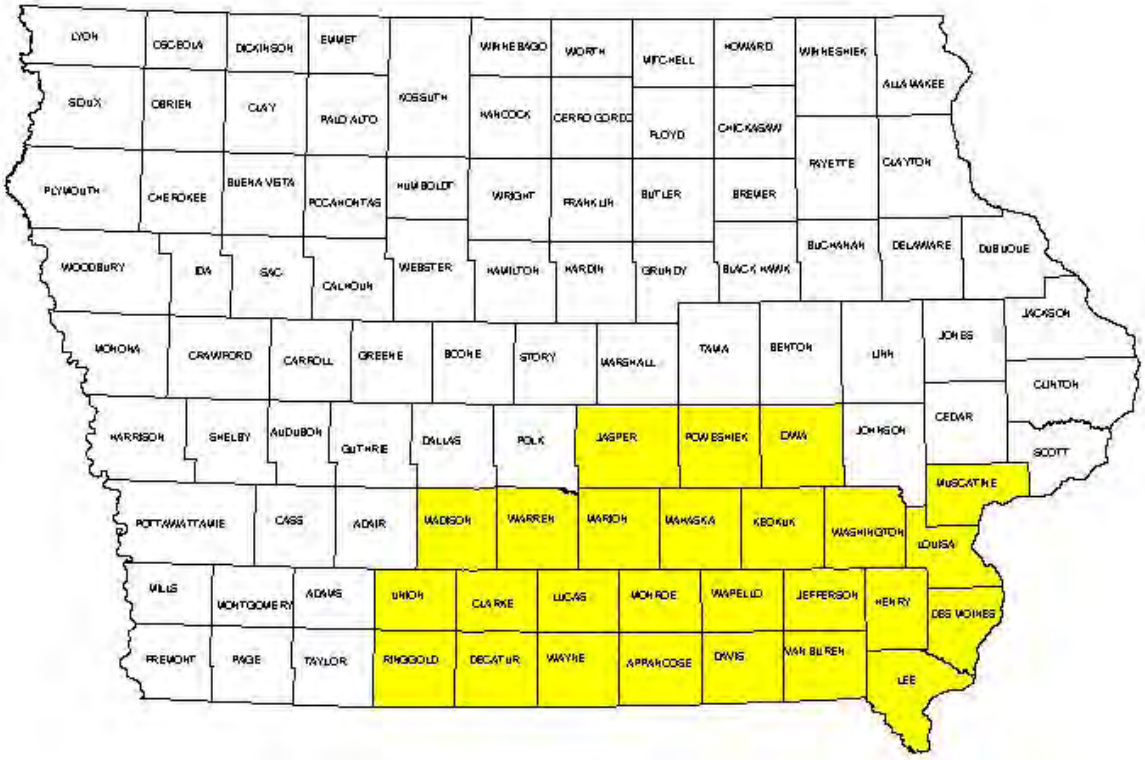
- No cut dates changed to April 15 through September 15
- Drop the requirement for the number of roost trees/acre
- Use the U.S. Fish and Wildlife Service guidelines for mist net surveys

The Indiana bat is a federal (50 CFR Part 17) and state (Code of Iowa, Chapter 481B) listed endangered species that occurs in southern Iowa from May through August. Female Indiana bats have their young beneath the loose or peeling bark of trees. Most nursery colonies have been found beneath the bark of standing dead trees on the trunk or large branches. Dead trees that retain sheets or plates of bark and which provide space beneath the bark such as red oak, post oak, and cottonwood are potential roost trees. Live trees such as shagbark and shellbark hickory are also used at times for roosting. The nursery colonies are located along streams and rivers or in upland forest areas. Riparian areas are also important feeding areas for this species. Indiana bats have been captured on the edge of urban areas. It is likely that the bats would be using only areas on the edge of the town or city and only if there is suitable habitat such as a greenbelt or a large park with a natural forest component that would have the below listed requirements. This would exclude city parks that are maintained as mowed areas.

Counties affected

Summer Range in Iowa: Appanoose, Clarke, Davis, Decatur, Des Moines, Henry, Iowa, Jasper, Jefferson, Keokuk, Lee, Louisa, Lucas, Madison, Mahaska, Marion, Monroe, Muscatine, Poweshiek, Ringgold, Union, Van Buren, Wapello, Warren, Washington, and Wayne.

The U.S. Fish and Wildlife Service considers all counties south of Interstate 80, including those portions of Dallas, Polk, Jasper, Poweshiek, Iowa, Johnson, Muscatine, and Scott counties south of Interstate 80, as being within the potential range of the species in Iowa.



Summer Habitat Requirements for the Indiana bat

Essential summer habitat in Illinois was considered to be 30% or greater deciduous forest cover within a 6/10 mile radius, permanent water within a 6/10 mile radius, and suitable roost trees within a 3/10 mile radius. Areas of as low as 5% deciduous forest cover provided suitable habitat as long as water and roost trees were within the listed distances in Illinois. In Iowa, records for the Indiana bat have occurred in areas of 15% or greater forest cover and near permanent water. Tree species that have been identified as roost trees from studies in other states are shagbark and shellbark hickory that may be alive or dead and dead, bitternut hickory, American elm, slippery elm, eastern cottonwood, silver maple, white oak, red oak, post oak, and shingle oak with slabs or plates of loose bark.

Suitable summer habitat in Iowa is considered to have the following within a ½ mile radius of a location:

1) Forest cover of 15% or greater

2) Permanent water

3) One or more of the listed tree species 9 inches dbh or greater

4) The potential roost trees ranked as moderate or high for peeling or loose bark

GLOSSARY

Acre: An area of land containing 43,560 square feet. A forty of land contains 40 acres and a section of land contains 640 acres.

Annual ring: Trees in climates where growths stops or slows during portion of the year will form annual rings which can be read to determine tree age and growth rate. Annual rings are highly visible in species that form less dense wood during favorable growing conditions early in the season and denser wood less favorable conditions later in the year. In some tree species this differentiation does not occur and annual rings are difficult to see. In tropical species growth never, or seldom, ceases and annual rings may not be apparent.

Bark: The outer layer of the stems, limbs and twigs of woody plants. Often bark is characteristic of the species and can be used for identification.

Basal area: The cross-sectional area of the base of any object. In forestry, it is the cross sectional area of a tree at 4.5 feet above the ground, expressed in square feet. The sum of all the trees on an acre is a measure of the density of the trees growing on the acre and is useful for making forest management decisions. Basal area can be calculated from tree diameter or can be easily measured with an angle gauge when certain relationships are known. Basal area will commonly range from 20 to 70 square feet per acre for poorly stocked stands to more than 200 square feet per acre for dense stands of conifers.

Biodiversity (biological diversity): The variety and abundance of species, their genetic

composition and the communities and landscapes in which they occur, including the ecological structures, functions and processes occurring at all of those levels.

Board foot: A unit of measure of wood 1” thick and 1 foot on each side equaling 1/12 cubic foot of wood.

Bole: The stem or trunk of a tree; usually thought of as being that part without limbs- the merchantable part of the stem.

Clearcut: A method of regenerating a forest in which all trees on a given area are cut.

Clearcutting results in conditions which allow the greatest amount of sunlight to reach the forest floor, a desirable condition for the regrowth of certain valuable tree species which need a lot of sunlight to grow, such as oak and walnut. Clearcutting also can create certain benefits for wildlife.

Competition: The struggle between trees to obtain sunlight, nutrients, water and growing space. Every part of the tree, from the roots to the crown, competes for space and food.

Conversion: A change though forest management from one tree species or association to another within a forest stand or site.

Cover type: Expressed as the tree species having the greatest representation in a forest stand. A stand where the major species is oak would be called an oak cover type.

Crop: The vegetation growing on a forest area, more particularly the major woody growth having commercial value.

Crop tree release: Crop tree release is the practice of selecting the individual trees that are to remain in the stand until maturity and then removing the trees competing with them. Crop trees could be selected on the basis of any of the values associated with trees such as aesthetics, wildlife or economic values. Selected trees should be straight with long, clear boles, dominant or co-dominant and should be the trees bringing the best returns upon maturity.

Crown: Refers to that part of the tree consisting of limbs, branches, twigs and leaves.

Cruise: A survey of forest land to identify timber and estimate its species composition, products, size, quality or other characteristics.

Cull: Refers to a tree having no commercial value, usually from having rot, holes, large knots or being crooked. It is important to note that a cull, though having no commercial value, may have wildlife, aesthetic or other values.

Cultural practice: The manipulation of vegetation to meet objectives of controlling stand composition or structure such as site improvement, forest stand improvement, increased regeneration, increased growth or insect and disease control measures.

D.B.H.: Diameter at Breast Height. Always taken at 4.5 feet above the ground.

Den tree: A tree that has a hole in its stem that can be used as shelter by wildlife.

Disturbance: Any event, either natural or human induced, that alters the structure, composition or functions of an ecosystem. Examples include forest fires, insect infestations, windstorms and timber harvesting.

Dominant (trees): Individuals or species of the upper layer of the forest canopy.

Early successional forest: The forest community that develops immediately following the removal or destruction of vegetation in an area. Plant succession is the progression of plants from bare ground (e.g., after a forest fire or timber harvest) to mature forest. Succession consists of a gradual change of plant and animal communities over time. Early succession forests commonly depend on and develop first following disturbance events. Each stage of succession provides different benefits for a variety of species.

Endangered species: A plant or animal species that is threatened with extinction throughout all, or a significant portion, of its native range.

Even-aged stand: A stand of trees composed of a single age class.

Forest: A forest is an ecosystem, an association of plants and animals. Trees are its dominant feature. They provide many benefits including habitat, water quality improvement, recreation, climatic amelioration and wood products. The plants and animals that make up a forest are interdependent and often essential to its integrity.

Forester: A professional engaged in the science and profession of forestry; foresters are commonly accredited by states or other certifying bodies (e.g., the Society of American

Foresters) and may be licensed, certified or registered indicating specific education and abilities.

Forest cover: All trees and other plants occupying the space in a forest, including any ground cover.

Forest fire: An uncontrolled fire on lands covered wholly or in part by timber, brush, grass, grain or other flammable vegetation.

Forest floor: The accumulated organic matter at the soil surface, including litter and unincorporated humus.

Forest inventory: A set of objective sampling methods designed to quantify the spatial distribution, composition and rates of change of forest parameters within specified levels of precision for the purposes of management.

Forest management: The practical application of biological, physical, quantitative, managerial, economic, social and policy principles to the regeneration, management, utilization and conservation of forests to meet specified goals and objectives while maintaining the productivity of the forest. Forest management includes management for aesthetics, fish, recreation, urban values, water, wilderness, wildlife, wood products and other forest resource values.

Forest stand: A stand may loosely be defined as a contiguous group of trees sufficiently uniform in species composition, arrangement of age classes and general condition to be a homogeneous and distinguishable unit. A stand is usually treated as a basic silvicultural unit, but it seldom represents a natural ecological unit. Its composition and structure are most strongly affected by management, other disturbances and chance factors affecting seed distribution, germination and seedling survival.

Forest Stand Improvement (FSI): A practice in which the quality of a residual forest stand is improved by removing less desirable trees to achieve the desired stocking of the best quality trees or to improve the reproduction, composition, structure, condition and / or volume growth of a stand.

Fully-stocked stand: A forest stand in which all growing space is effectively occupied but having ample space for development of crop trees.

Game species: Game species include those terrestrial species that are hunted and trapped.

Geographic Information System (GIS): Computer software used to manipulate, analyze and visually display inventory and other data.

Group selection: A process of harvesting patches of selected trees to create openings in the forest canopy and to encourage reproduction of uneven-aged stands.

Hardwood: Hardwoods are generally defined as the woods of deciduous trees (i.e., trees which shed their leaves in the winter).

Landform: Any physical, recognizable form or feature of the earth‟s surface having a characteristic shape and produced by natural causes. Examples of major landforms are plains, plateaus and mountains. Examples of minor landforms are ills, valleys, slopes, eskers and dunes. Together, landforms make up the surface configuration of the earth.

Landscape: A general term referring to geographic areas that are usually based on some sort of natural feature or combination of natural features. They can range in scale from very large to very small.

Leave trees: Live trees selected to remain on a site to provide present and future benefits, such as shelter, resting sites, cavities, perches, nest sites, foraging sites, mast and coarse woody debris.

Management goals: Overall purpose for managing the composition and structure of forest land. For example: to protect land from erosion, to maintain wildlife habitat, to control insect and disease outbreaks, etc.

Management objectives: Defined conditions for the property, or segments of property (e.g. stands or management units), that will achieve management goals.

Management plan: A plan outlining the objectives for individual management units and describing steps for achieving them. Silvicultural procedures are identified in broad terms, but detailed prescriptions are developed in the field.

Mast: Nuts, seeds, catkins, flower buds and fruits of woody plants that provide food for wildlife.

Mature tree: A tree that has reached the desired size or age for its intended use. Size or age will vary considerably depending on the species, intended uses and site conditions.

Merchantable timber: Trees or stands having the size, quality and condition suitable for marketing under a given economic condition.

Multiple use: Using and managing a forested area to provide more than one benefit simultaneously. Common uses may include wildlife, timber, recreation and improvement of water quality.

Native plant community: A group of native plants that interact with each other and with its environment in ways not greatly altered by modern human activity or by introduced organisms. Native plants communities are classified and described by physiognomy,

hydrology, landforms, soils and natural disturbance regimes (e.g., wild fires, wind storms, normal flood cycles).

Natural disturbances: Disruption of existing conditions by natural events such as wildfires, windstorms, droughts, flooding, insects and disease.

Natural regeneration: The growth of new trees from one of the following ways: (a) seeds naturally dropped from trees or carried by wind or animals, (b) seeds stored on the forest floor or (c) stumps that sprout or roots that sucker.

Non-forest land: Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses such as crops, pasture, residential areas, city parks, improved roads and power line clearings.

Non-game species: Non-game species include amphibians, reptiles, and those mammal and bird species that are not hunted or trapped.

Old-growth forests: Forests defined by age, structural characteristics and relative lack of human disturbance. These forests are essentially free from catastrophic disturbances, contain old trees (generally over 120 years old), large snags and downed trees.

Overstory: The canopy in a stand of trees.

Plantation: A stand composed primarily of trees established by planting or artificial seeding.

Pole or pole timber: A young tree or stand of young trees between 3.5 inches and 12.9 inches dbh.

Prairie: An extensive tract of level or rolling land that was originally treeless and grass covered. A prairie is generally characterized by deep fertile soil and regular disturbance, usually by fire.

Prescribed burn: To deliberately burn wild lands in either their natural or their modified state under specified environmental conditions, which allows the fire to be confined to a predetermine area and produces the intensity and spread required to attain planned resource management objectives.

Pruning: The practice of removing tree limbs so that a straight bole, free of limbs, will develop. Pruning can be a component of FSI.

Recreation: Leisure activities involving the enjoyment and use of natural resources.

Recreation facility: The improvements within a developed recreation site offered for visitor"s enjoyment.

Regeneration: The act of renewing tree cover by establishing generation usually maintaining the same forest type forest that was removed. Regeneration may be artificial (direct seeding or planting) or natural (natural seeding or planting).

Release (release operation): A treatment designed to free young trees from undesirable, usually over-topping, competing vegetation.

Restoration: A new planting of seedlings, direct seeding or regeneration of roots. This creates new habitat that will be of higher quality for wildlife.

Riparian: Related to, living or located in conjunction with a wetland, river, stream or lake.

Riparian buffer: Woodland next to streams, lakes and wetlands that are managed to enhance and protect aquatic resources. Buffers provide woody cover that will enhance soil and water conservation while providing wildlife habitat.

Rotation age: The period of years between when a forest stand is established and when it receives its final harvest. This time period is an administrative decision based on economics, site conditions, growth rates and other factors.

Salvage cut: A harvest made to remove trees killed or damaged by fire, wind, insects, disease, or other agents. The purpose of salvage cuts is to use available wood fiber before further deterioration occurs to recover value that otherwise would be lost.

Sanitation cut: A cutting made to remove trees killed or injured by fire, insects, disease or other injurious agents (and sometimes trees susceptible to such injuries).

Sapling: A young tree larger than a seeding but smaller than a pole (dbh < 3.5 inches).

Sapwood: The wood found closest to the bark or outside of the bole and usually distinguished from heart wood by being lighter in color.

Saw log: A log large enough to produce lumber or other products that can be sawed. Its size and quality vary with the utilization practices of the region.

Sawtimber: Trees that yield logs suitable in size and quality for the production of lumber.

Scarify: To break up the forest floor and topsoil preparatory to natural regeneration or direct seeding.

Seedling: A baby plant. In forestry the term usually used to refer to young trees that have grown beyond the stage where they have just emerged from the soil up to the point that they become saplings.

Seed tree: Any tree that bears seed; specifically, a tree left standing to provide the seed for natural regeneration.

Seed tree method: The harvest of all trees except for a small number of widely dispersed trees retained for seed production and to produce a new age class. Seed trees are usually removed after regeneration is established.

Selective harvest: Removal of single scattered trees or small groups of trees at relatively short intervals. The continuous establishment of reproduction is encouraged

and an all-aged stand is maintained. A management option used for shade-tolerant species.

Shade tolerance: Relative ability of a tree species to reproduce and grow under shade. The capacity to withstand low-light intensities caused by shading from surrounding vegetation.

Shelterwood: A method of regenerating a forest whereby a portion of the stand is harvested and the rest of the stand is evenly distributed over the area to protect the site and provide seed to regenerate the area. After the new stand is well established, the residual trees are harvested. This method is used to regenerate shade intolerant species.

Shelterwood harvest: A harvest cutting in which trees in the harvest area are removed in a series of two or more cuttings to allow the establishment and early growth of new seedlings under partial shade and protection of older trees. Produces an even-aged forest.

Silvics: The study of the life history and general characteristics of forest trees and stands, with particular reference to environmental factors, as basis for the practice of silviculture.

Silviculture: The art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Silvicultural prescription: Specific steps prescribed to achieve specific management objectives.

Single tree selection: Individual trees of all sizes classes are removed more or less uniformly throughout the stand, to promote growth of remaining trees and to provide space for regeneration; synonym: individual tree selection.

Site index: A measure of the productive quality of an area where trees grow. Site index is based on the height of dominant and co-dominate trees at age 50. That is to say, if the average height of dominant and co-dominate trees on a site was 70 feet at age 50, 70 would be the site index. Graphs are developed to enable determination of site index over a range of tree ages.

Site potential: Collective physical resources (e.g., soil moisture, nutrients, light, heat) available for plant growth. Different potentials facilitate growth of some species and limit growth of others. Consequently, site potential has a strong effect on plant community development.

Slash: The non-utilized and generally unmarketable accumulation of woody material in the forest, such as limbs, tops, cull logs and stumps that remain in the forest as residue after timber harvesting.

Snag: A snag tree is a dead tree; commonly a tall, limbless tree. Though of little or no commercial value, they are a very valuable wildlife resource.

Softwood: Generally considered to be the wood of conifers.

Stand: A contiguous group of trees similar in age, species composition, structure and growing on a site of similar quality. One stand will usually have characteristics that will distinguish it from other stands. Differences could include species, average diameter, density and location.

Succession: The natural replacement, over time, of one plant community with another.

Sucker: A shoot rising from below ground level from a root.

Suppressed: The condition of a tree characterized by low growth rate and low vigor due to competition from overtopping trees or shrubs.

Sustainability: Protecting and restoring he natural environment while enhancing economic opportunity and community well-being. Sustainability addresses three related elements: the environment, the economy and the community. The goal is to maintain all three elements in a healthy state indefinitely. Meeting the needs of the present without compromising the ability of future generations to meet their needs.

Thinning: A silvicultural treatment made to reduce the density of trees within a forest stand; primarily used to improve growth, enhance forest health or recover potential mortality. Row thinning is where selected rows are harvested, usually the first thinning, which provides equipment operating room for future selective thinning. Selective thinning is where individual trees are marked or specified (e.g., by diameter, spacing, or quality) for harvest. Commercial thinning is thinning after the trees are of merchantable size for timber markets. Pre-commercial thinning is done before the trees reach merchantable size, usually done in overstocked stands to provide more growing space for crop trees.

Threatened species: A plant or animal species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its native range.

Tolerance (shade tolerance): A plant"s ability to tolerate conditions under a forest canopy.

Normally thought of as tolerance to low light conditions, but other understory conditions, such as root competition for water and nutrients, are also factors.

Two-aged stand: A stand with trees of two distinct age class separated in age by more than 20 percent of the rotation age.

Under plant: The planting of seedlings under an existing canopy or overstory.

Under-stocked: A stand of trees so widely spaced that even with full growth potential realized, crown closure will not occur.

Understory: The shorter vegetation (shrubs, seedlings, saplings, small trees) within a forest stand that forms a layer between the overstory and the herbaceous plants of the forest floor.

Uneven-aged stand: A stand with trees of three or more distinct age classes, either mixed or in small groups.

Uneven-aged management: A planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes. Uneven-aged (selection) methods will maintain a multi-aged structure by removing some trees in all sizes classes either singly, in small groups or in strips: synonym: all-aged method.

Viewshed: A physiographic area composed of land, water biotic and cultural elements which may be viewed from one or more viewpoints and which has inherent scenic qualities and/ or aesthetic values as determined by those who view it. Viewsheds are a habitat factor that will be primarily a “hands-off” area for aesthetics and proper soil and water conservation, along with providing special wildlife values.

Volume: Refers to the amount of wood in a tree or log. Expressed as board feet, cords or other measures.

Well-stocked: The situation in which a forest stand contains trees spaced widely enough to prevent competition yet closely enough to utilize the entire site.

Wolf tree: A generally predominant tree with a broad, spreading crown that occupies more growing space than its neighbors.

Woodland: A plant community in which, in contrast to a typical forest, the trees are often small, characteristically short-boled relative to their crown depth, and forming an open canopy with intervening area occupied by lower vegetation, commonly grass.

Woodland edge: An area of habitat transition that consists of vegetation (herbaceous and woody) of different heights and densities. Edge can favor early successional wildlife species.